0069466

SAF-RC-051
100 & 300 Area Component of the RCBRA - Incremental Soil Sampling
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Jill Thomson	H0-23	____NB 3/29/06 INITIAL/DATE
Jeanette Duncan	H9-02	___NB 3/29/06 INITIAL/DATE

COMMENTS:

SDG _E2877___ SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Waste Site: Riparian Elevated Site #3 Upriver 100-D

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MAR 2006

BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted January 25 through March 3, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
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March 28, 2006
Lab I.D. Nos. B1542-01 thru 09
SDG Number BG1542

SDG: E2877
SAF: RC-051

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INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from January 25 through March 3, 2006.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Standard Guide for Conducting Terrestrial Plant Toxicity Tests*, ASTM E 1963-02 (2002).

TEST ORGANISMS

The seeds used were obtained from Native Grass Seeds, Cornville, Arizona. All test conditions were maintained during planting, germination, and growth phases of the test as prescribed by the ASTM protocol.

CONTROL SOIL

The control soil used in the tests was artificial soil comprised of 70 grade silica sand (70 percent by weight), kaolin clay (20 percent), and peat moss (10 percent). Calcium carbonate (0.4 percent of total weight) was added to adjust soil pH to 7.0 ± 0.5.

HYDRATION WATER

The water used to initially hydrate the control and test soils was Milli-Q equivalent de-ionized water. After initial hydration, all test chambers were watered with half strength Hoagland's solution on an every other day basis. All hydration was accomplished via sub irrigation.

TEST CONCENTRATIONS

The concentration tested in the bluegrass tests was 100 percent test soil with control soil alone for the lab control. For the bluegrass tests, 50 seeds per concentration were used with five replicate test chambers per concentration and 10 seeds planted per chamber. Following germination, test chambers were thinned to a maximum five seedlings per replicate.

SAMPLE COLLECTION

Individual soil samples used during the testing were collected between October 31, 2005, and December 6, 2005. The samples were stored in the dark at 4°C until the initiation of the initiation of the tests. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

Table 1 provides a cross-reference of the Client ID numbers, sampling dates, sampling locations, Bluegrass test sample identification (SDG) numbers, and Analytical Lab SDG numbers.

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Bluegrass test SDG	Analytical Lab SDG	
J10DW4	10/31/2005	600-131	BG1542-01	E2748	-Rerun
J10DV4	11/08/2005	PIT 23	BG1542-02	E2801	-Rerun
J10DT8	11/14/2005	Upland Backfill Elevated-100-F-2	BG1542-03	E2831	-Rerun
J10DV2	11/15/2005	Upland Native Reference-Central Plateau	BG1542-04	E2846	
J10DV1	11/15/2005	Upland Backfill Low-116-DR-1&2	BG1542-05	E2847	
J10DV3	11/16/2005	Upland Native Elevated-JA Jones	BG1542-06	E2857	
J10DV0	11/21/2005	Riparian Elevated-Site #3 Upriver 100-D	BG1542-07	E2877	
J10LJ5	11/28/2005	Riparin Low-Site #10 Downriver 100-D	BG1542-08	E2897	-Rerun
J10DT9	12/06/2005	Riparian Reference-Site #13 Vernita Bridge	BG1542-09	E2953	

SAMPLE PREPARATION

Test soils and control soil were dried and homogenized prior to use. For each replicate, 90 grams dry weight of soil was added to each test chamber. The soils were initially hydrated with Milli-Q equivalent de-ionized water via sub irrigation. In addition, a sub sample of the soil was added to a surrogate chamber and hydrated for pH measurements.

TEST INITIATION

Tests were initiated by planting 10 seeds in each test chamber. Seeds were planted at a depth of 1 ½ times the seeds diameter (approximately 2 millimeters) and covered gently with soil. A small amount of hydration water (10 ml) was sprayed onto the soil surface to ensure seeds received moisture.

TEST MONITORING

According to information provided by Native Grass Seed (seed supplier), germination should take place between 14 and 28 days. The number of seeds in each test chamber that had germinated was recorded on days 12, 14, 16, 21, and 23. Germination was determined to have occurred on day 23.

Observations of the shoot appearance were recorded 7 days after germination (30 days after planting). The number of germinated seeds in each test chamber was also recorded. Chambers that had more than five germinated seeds had shoots removed to prevent overcrowding. These test chambers were thinned to five seedlings each.

Soil pH was taken at test initiation and termination by placing a subsample of soil into a specimen cup, adding hydration water, and mixing prior to the pH measurement.

TEST TERMINATION

Tests were terminated 14 days post germination. The number of seedlings, shoot appearance and height (tallest shoot of each plant), and root appearance and length (longest recovered root of each plant) was recorded.

For each test chamber, all of the above ground biomass (i.e. shoots) from all germinated plants were combined and placed into tarred aluminum tins. The shoots were weighed to determine the wet weight immediately following removal from the test chamber. The shoots were then dried in an oven at 60 °C for a minimum of 24 hours. The shoots were then placed into a desiccator for a minimum of 2 hours and weighed to determine dry weight.

The wet and dry weight for the roots were obtained following the same procedure as described above.

DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

- 14 Day Post-Germination Survival (%)
  (Calculated as the number of seedlings alive at 14 day post germination divided by 5)
- Average Above Ground Shoot Mass (Wet)
  (Calculated as the total wet weight of the shoots divided by the number of seedlings harvested)
- Average Above Ground Shoot Mass (Dry)
  (Calculated as the total dry weight of the shoots divided by the number of seedlings harvested)
- Average Root Mass (Wet)
  (Calculated as the total wet weight of the roots divided by the number of seedlings harvested)
- Average Root Mass (Dry)
  (Calculated as the total dry weight of the roots divided by the number of seedlings harvested)
- Average Total Mass (Wet)
  (Calculated as the total combined wet weights of the shoots and roots divided by the number of seedlings harvested)
- Average Total Mass (Dry)
  (Calculated as the total combined dry weights of the shoots and roots divided by the number of seedlings harvested)
- Average Shoot Height
  (Calculated as the total combined height of the tallest shoot of each seedling divided by the number of seedlings harvested)
- Average Root Length
  (Calculated as the total combined length of the longest root of each seedling divided by the number of seedlings harvested)

Note: Due to a laboratory error; the Shoot Height for samples J10DT8 and J10LJ5, was measured only for the single tallest shoot in each replicate. Similarly, the Root Length for samples J10DW4, J10DV4, J10DT8, and J10LJ5, was measured only for the single longest root from each replicate. As a result, statistical analysis for these endpoints on these samples was not performed.

Statistical analysis for each endpoint listed comprised of entering the data obtained from each replicate chamber of a test soil and comparing the results to the data from the replicate chambers of the laboratory control. Comparisons were made as a single tailed t-test, evaluating for statistically significant reductions from the control value, using CETIS version 1.1.2. The Equal Variance t Two-Sample test was used. When the assumptions of equality of variance or normality necessary for Equal Variance t Two-Sample test was not met, the Unequal Variance t Two-Sample test or Wilcoxon Rank Sum Two Sample test was used.

The endpoint data and the results statistical analysis are summarized in Table 2 below. The data represents the average value of the replicate chambers used in each test concentration.

RESULTS AND DISCUSSION

Table 2 summarizes the results of the bluegrass tests.

The results for sample J10DW4 indicated a statistically significant reduction in germination, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (dry), average total mass (shoots + roots wet), and average total mass (shoots + roots dry) when compared to the laboratory control.

The results for sample J10DV1 indicated a statistically significant reduction in germination, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots wet), and average total mass (shoots + roots dry) when compared to the laboratory control.

The results for sample J10DT9 indicated a statistically significant reduction in germination when compared to the laboratory control.

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

E, statistically significant difference from lab control by use of Equal Variance t Two-Sample Test

ns indicates a non statistically significant result; *, indicates statistically significant at alpha (α) = 0.05; --, indicates no statistical test performed.

Lab ID: Sample Number	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average Stem Height (mm)	Significantly different compared to Lab Control?	Bluegrass Average Root Length (mm)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Wet) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Dry) (mg)	Significantly different compared to Lab Control?
Tests initiated on Jan 25, 2006																		
Laboratory Control	88	--	10.8	--	28.5	--	63.9	--	12.35	--	113.2	--	7.87	--	177.1	--	20.22	--
BG1542-01 J16DW4	80	E *	14.8	ns	--	--	40.5	E *	7.30	E *	72.4	ns	3.27	E *	112.9	E *	10.57	E *
BG1542-02 J16DV4	84	ns	20.3	ns	--	--	76.2	ns	14.85	ns	122.8	ns	6.58	ns	199.0	ns	21.43	ns
BG1542-03 J16DT6	84	ns	--	--	--	--	80.9	ns	16.72	ns	172.1	ns	19.00	ns	253.0	ns	36.72	ns
BG1542-04 J16DV2	72	ns	15.1	ns	30.8	ns	56.5	ns	10.67	ns	101.0	ns	6.50	ns	159.5	ns	17.20	ns
BG1542-05 J16DV1	36	E *	22.4	ns	52.2	ns	25.0	E *	6.70	E *	41.0	E *	3.33	E *	71.8	E *	10.03	E *
BG1542-06 J16DV3	84	ns	23.7	ns	54.1	ns	68.4	ns	5.13	ns	84.5	ns	14.85	ns	145.0	ns	14.05	ns
BG1542-07 J16DV0	76	ns	11.7	ns	23.8	ns	76.9	ns	14.66	ns	123.8	ns	9.10	ns	200.8	ns	23.76	ns
BG1542-08 J10LJ5	92	ns	--	--	--	--	78.3	ns	16.96	ns	127.5	ns	5.37	ns	205.8	ns	16.34	ns
BG1542-09 J16DT9	48	E *	16.5	ns	36.9	ns	51.8	ns	8.66	ns	90.7	ns	5.09	ns	141.7	ns	13.72	ns

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the Statement of Work, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature:

APPENDIX A
RAW DATA SHEETS

BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006 ab 33-06

Initials: Day 0 Br Day 12 NJ Day 14 Br Day 16 Br Day 21 AP Day 28 Br Day 37 Br

Sample ID: Lab Control (70% 70 grade silica sand, 20% clay, 10% peat)

CONC.	REPLICATE	# seeds germinated: PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	7-DAYS POST-EMERGENCE (21 days after planting)			14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (28 days after planting)
					21	23	30			
Control	A	2	3	5	3	5	5	5	6.7	6.4
	B	1	3	6	7	7	7→5	5		
	C	5	6	7	7	7	5	5		
	D	0	2	2	4	4	3	3		
	E	2	3	3	3	3	3	4		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance: Br 2

Replicate A: 3 large plants w/ good color & multiple stems, 2 smaller

Replicate B: 7 medium plants, multiple stalks - pared down to 5 (removed smallest)

Replicate C: 1 large, 4 medium w/ good color - 2 dead & dried (1 medium has 1 brown stalk)

Replicate D: 1 medium, 2 small (1 w/ 1 brown stalk) + 1 small dead

Replicate E: 3 medium w/ good condition

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 med + 2 sm - good color - no brown

Replicate B: 5 med - good color - no brown

Replicate C: 1 lg + 4 med - good - 1 med w/ 1 brown shoot

Replicate D: 1 med + 2 sm - good

Replicate E: 3 medium + 1 small - good w/ 1 medium having 2 brown shoots

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# shoots/blades
Replicate A	66 mm	43 mm	36 mm	65 mm	43 mm	11, 13, 4, 15, 4
Replicate B	42 mm	43 mm	39 mm	41 mm	44 mm	9, 13, 8, 11, 7
Replicate C	54 mm	87 mm	48 mm	45 mm	45 mm	13, 18, 12, 11, 10
Replicate D	50 mm	28 mm	32 mm	mm	mm	13, 5, 3
Replicate E	64 mm	49 mm	45 mm	16 mm	mm	12, 15, 11, 2

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	993.05	1329.5	1068.91
Replicate B	993.45	1269.4	1046.21
Replicate C	981.31	1393.0	1077.69
Replicate D	1004.53	1224.2	1031.01
Replicate E	977.10	1143.0	1008.81

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	148 mm	139 mm	74 mm	118 mm	215 mm
Replicate B	138 mm	143 mm	144 mm	135 mm	150 mm
Replicate C	153 mm	158 mm	135 mm	164 mm	156 mm
Replicate D	157 mm	71 mm	70 mm	mm	mm
Replicate E	78 mm	47 mm	76 mm	158 mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	987.99	1704.8	1031.77
Replicate B	977.88	1681.0	1019.85
Replicate C	993.58	1786.2	1084.12
Replicate D	981.03	1197.1	992.37
Replicate E	976.75	1133.3	993.93

Comments: 60g dry wt./rep

BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 Br Day 12 NT Day 14 Br Day 16 NT Day 21 [illegible] Day 30 NT

Sample ID: E274801-SO12 B1542-01

CONC.	REPLICATE	# seeds germinated: PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	21	7-DAYS POST-EMERGENCE (21 days after planting)	23	30	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (28 days after planting)
100%	A	0	3	3	3	3		3	3	6.9	6.8
	B	1	2	3	3	4		2	2		
	C	0	1	1	3	3		2	2		
	D	1	2	3	4	4		4	4		
	E	0	2	4	4	4		4	4		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 medium plants w/ multiple green shoots.

Replicate B: 1 medium in good shape + 1 medium w/ 3 green & 1 brown shoot, + 2 small dead plants

Replicate C: 2 medium in good shape + 1 small dead single shoot

Replicate D: 2 medium in good shape + 2 medium w/ browning tips on 1 shoot each.

Replicate E: 3 medium in good shape + 1 medium w/ 3 green & 1 brown shoot.

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 medium plants

Replicate B: 2 small plants 1 has a brown shoot

Replicate C: 2 small plants

Replicate D: 4 small/med plants 1 has brown shoot

Replicate E: 3 med 1 small plant small plant has 4 brown shoots

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# Shoots
Replicate A	41 mm	40 mm	50 mm	— mm	— mm	7, 9, 10
Replicate B	45 mm	34 mm	— mm	— mm	— mm	5, 6
Replicate C	30 mm	37 mm	— mm	— mm	— mm	11, 4
Replicate D	61 mm	40 mm	35 mm	40 mm	— mm	14, 8, 7, 8
Replicate E	55 mm	45 mm	45 mm	40 mm	— mm	5, 6, 10, 9

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1018.53	1184.9	1050.49
Replicate B	993.52	1032.6	1000.87
Replicate C	999.72	1076.3	1010.18
Replicate D	992.70	1154.4	1019.37
Replicate E	1036.15	1231.8	1077.30

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	115 mm	mm	mm	mm	mm
Replicate B	100 mm	mm	mm	mm	mm
Replicate C	119 mm	mm	mm	mm	mm
Replicate D	87 mm	mm	mm	mm	mm
Replicate E	130 mm	mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1022.95	1367.6	1036.40
Replicate B	1012.46	1094.5	1017.15
Replicate C	1003.84	1092.6	1007.87
Replicate D	990.52	1324.7	1003.06
Replicate E	988.23	1313.1	1004.41

Comments: 90 g dry wt. / rep

CETIS Test Summary

Report Date: 10 Mar-06 2:57 PM
Test Link: 19-6708-8127/B154201psc

Plant Chronic test — CH2M Hill

Test No:	03-9091-7145	Test Type:	Plant Chronic test	Duration:	37d 0h
Start Date:	25 Jan-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:	03 Mar-06	Dil Water:		Source:	
Setup Date:	25 Jan-06 12:00 AM	Brine:			
Comments:	E274801				

Sample No:	18-1426-8954	Code:	B1542-01	Client:	
Sample Date:	31 Oct-05	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	86d 0h	Station:			
Comments:	J10DW4, E274801				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-2631-8684	% Germination	< 100	100	N/A	23.72%	Equal Variance t Two-Sample
11-3105-6016	AG Average Dry Wt.	< 100	100	N/A	38.24%	Equal Variance t Two-Sample
16-3143-7290	AG Average Height	100	> 100	N/A	31.73%	Equal Variance t Two-Sample
10-9196-2081	AG Average Wet Wt.	< 100	100	N/A	27.27%	Equal Variance t Two-Sample
04-0460-7096	Root Average Dry Wt.	< 100	100	N/A	45.60%	Equal Variance t Two-Sample
07-1811-0773	Root Average Wet Wt.	100	> 100	N/A	41.42%	Equal Variance t Two-Sample
11-7102-7292	Total Average Biomass Dry	< 100	100	N/A	40.05%	Equal Variance t Two-Sample
02-3271-9163	Total Average Biomass Wet	< 100	100	N/A	33.72%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 2:57 PM
Test Link: 19-6708-8127/B154201psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.60000	0.40000	0.80000	0.08944	0.20000	33.33%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	7.2993	3.675	10.637	1.3763	3.0775	42.16%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	14.833	11	20	1.6915	3.7823	25.50%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	40.525	19.54	55.457	6.0773	13.589	33.53%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	3.268	2.015	4.6500	0.4968	1.1108	33.99%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	72.356	40.920	111.72	13.274	29.681	41.02%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	10.567	6.02	15.287	1.8513	4.1395	39.17%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	112.88	60.46	167.17	18.747	41.919	37.14%

CETIS Test Summary

Report Date: 10 Mar-06 2:57 PM
Test Link: 19-6708-8127/B154201psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.60000	0.40000	0.40000	0.80000	0.80000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		10.6366	3.67499	5.23001	6.6675	10.2875

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		14.6667	20	17	11	11.5

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		55.4567	19.54	38.2900	40.4250	48.9125

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		4.65000	2.34500	2.01498	3.28499	4.045

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		111.717	40.9200	44.38	83.545	81.2175

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		15.2866	6.01999	7.245	9.95248	14.3325

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		167.173	60.46	82.6700	123.97	130.130

CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:56 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	23.72%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.36128	1.85955	0.0229	0.24559	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2431297	0.24313	1	5.58	0.04587	Significant Effect
Error	0.3488457	0.043606	8			
Total	0.59197535	0.2867354	9			

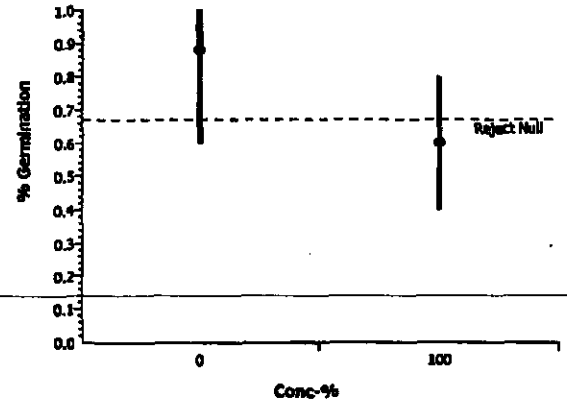
ANOVA Assumptions

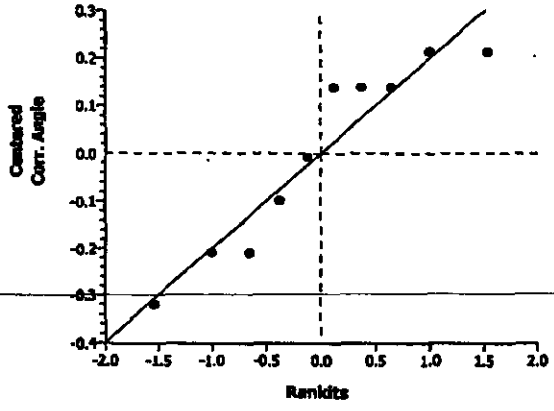
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.04816	23.15450	0.96473	Equal Variances
Distribution	Shapiro-Wilk W	0.88173		0.13660	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.60000	0.40000	0.80000	0.20000	0.89396	0.68472	1.10715	0.21126

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:56 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.24%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.98886	1.85955	0.0410	4.72307	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	63.79421	63.79421	1	3.96	0.08192	Non-Significant Effect
Error	129.0223	16.12778	8			
Total	192.816475	79.921995	9			

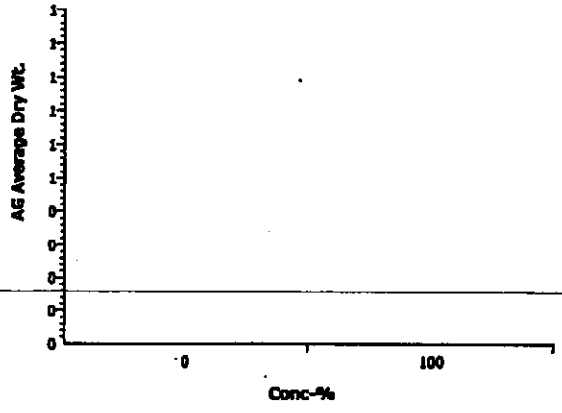
ANOVA Assumptions

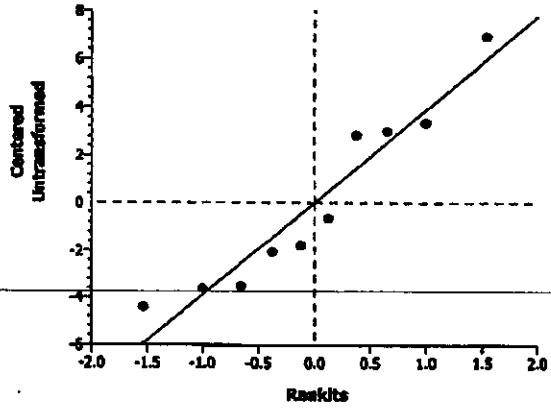
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.40572	23.15450	0.41603	Equal Variances
Distribution	Shapiro-Wilk W	0.91144		0.29103	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	7.2993	3.675	10.637	3.0775				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:57 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	31.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-2.3202	1.85955	0.9755	3.37146	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	44.24011	44.24011	1	5.38	0.04890	Significant Effect
Error	65.74311	8.217889	8			
Total	109.983223	52.458001	9			

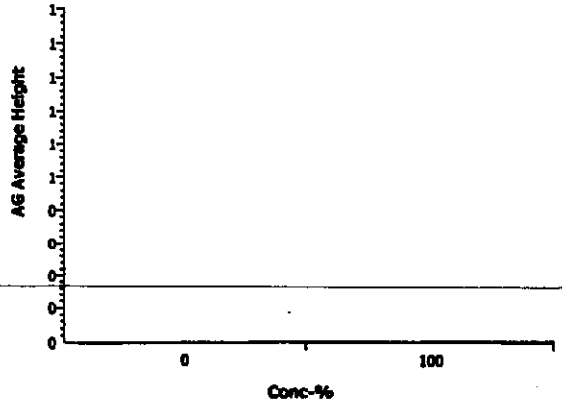
ANOVA Assumptions

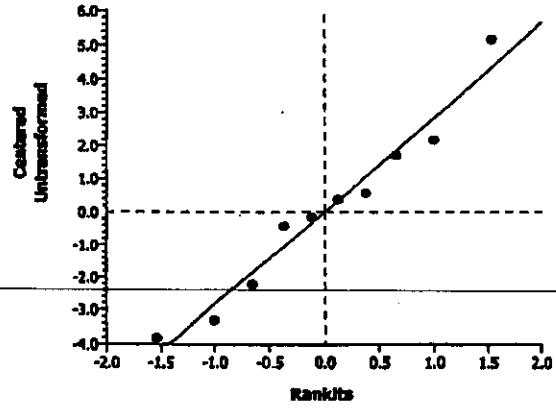
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.71552	23.15450	0.09208	Equal Variances
Distribution	Shapiro-Wilk W	0.96385		0.82873	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		5	14.833	11	20	3.7823				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:56 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.27%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.49513	1.85955	0.0186	17.4233	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1366.377	1366.377	1	6.23	0.03722	Significant Effect
Error	1755.801	219.4752	8			
Total	3122.17810	1585.852	9			

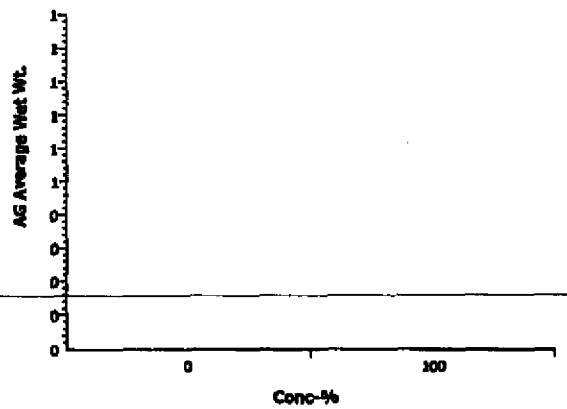
ANOVA Assumptions

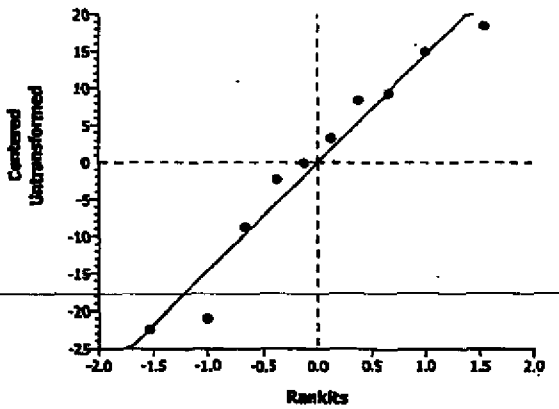
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.37694	23.15450	0.76412	Equal Variances
Distribution	Shapiro-Wilk W	0.93736		0.52406	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	53.903	41.475	82.338	15.946				
100		5	40.525	19.54	55.457	13.589				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:57 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	45.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.38399	1.85955	0.0221	3.58697	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	52.86784	52.86784	1	5.68	0.04427	Significant Effect
Error	74.41687	9.302109	8			
Total	127.28471	62.169949	9			

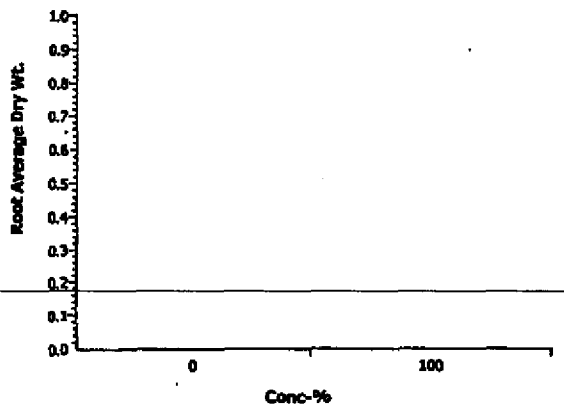
ANOVA Assumptions

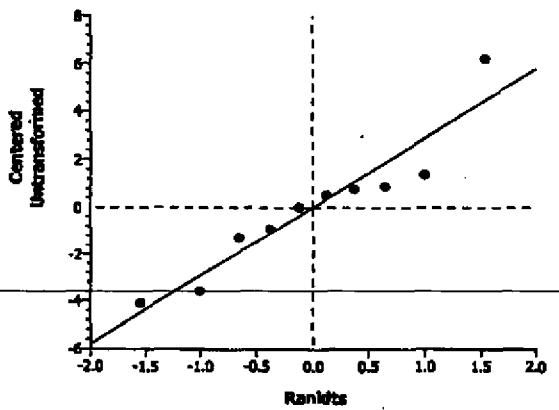
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	14.07658	23.15450	0.02523	Equal Variances
Distribution	Shapiro-Wilk W	0.91314		0.30324	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	3.268	2.015	4.6500	1.1108				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Wet Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:57 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	41.42%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.62059	1.85955	0.0719	46.906	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4177.597	4177.597	1	2.63	0.14376	Non-Significant Effect
Error	12725.4	1590.675	8			
Total	16902.9961	5768.2716	9			

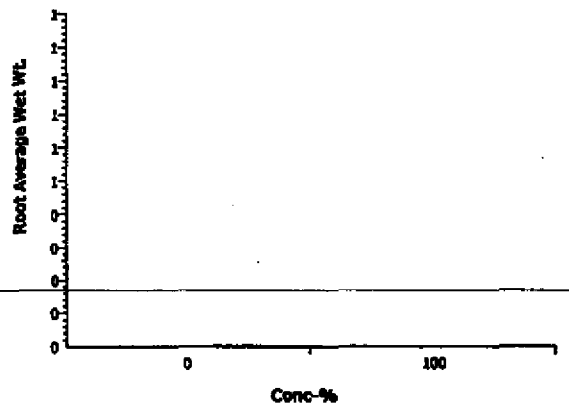
ANOVA Assumptions

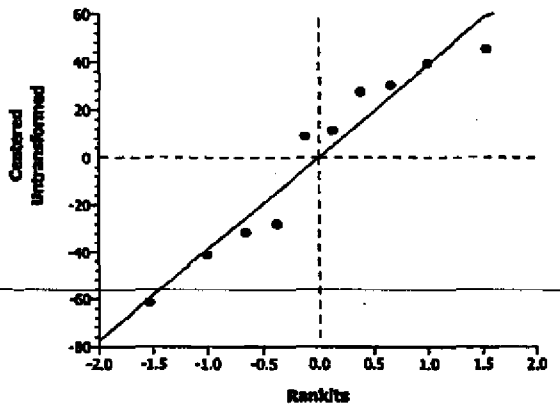
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.61121	23.15450	0.37516	Equal Variances
Distribution	Shapiro-Wilk W	0.91516		0.31837	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	72.356	40.920	111.72	29.681				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:57 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	40.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.21643	1.85955	0.0288	8.09629	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	232.8113	232.8113	1	4.91	0.05750	Non-Significant Effect
Error	379.1292	47.39115	8			
Total	611.940475	280.20242	9			

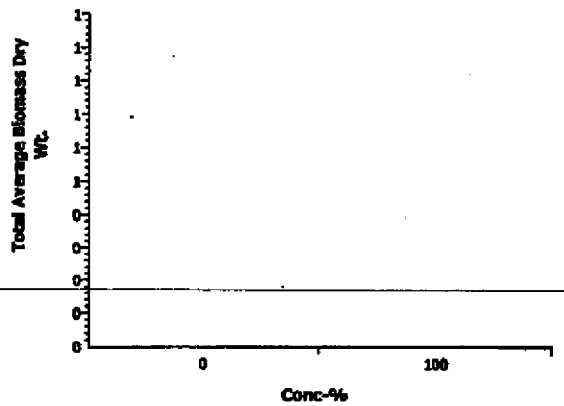
ANOVA Assumptions

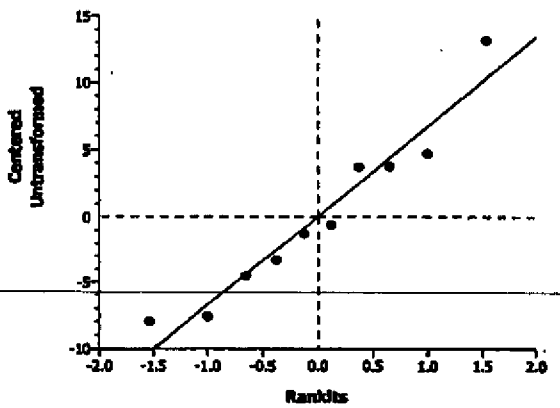
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.53128	23.15450	0.17247	Equal Variances
Distribution	Shapiro-Wilk W	0.93905		0.54254	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	10.567	6.02	15.287	4.1395				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison	19-6708-8127	19-6708-8127	10 Mar-06 2:57 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.72%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.00028	1.85955	0.0402	59.7359	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	10322.33	10322.33	1	4.00	0.08048	Non-Significant Effect
Error	20638.88	2579.86	8			
Total	30961.2119	12902.189	9			

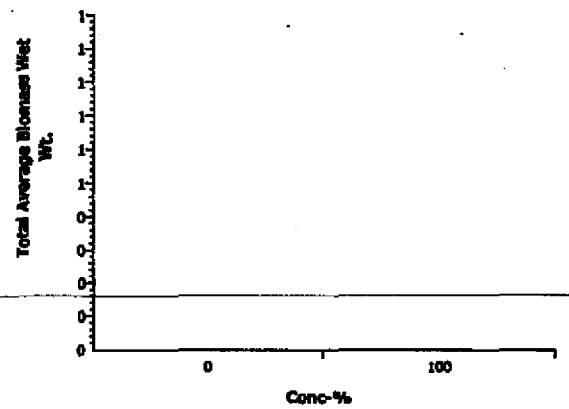
ANOVA Assumptions

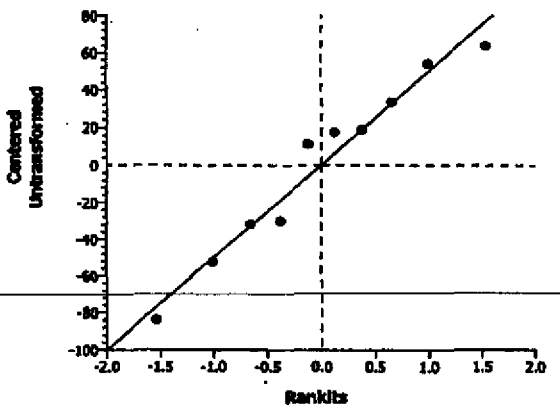
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.93632	23.15450	0.53790	Equal Variances
Distribution	Shapiro-Wilk W	0.95158		0.68718	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	112.88	60.46	167.17	41.919				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 Br Day 12 NKT Day 14 Br Day 16 NS Day 21 (BB) Day 28 Br

Sample ID: E280101-SOI2 B1542-02

CONC.	REPLICATE	PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	21	23	7-DAYS POST-EMERGENCE (21 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH INITIAL (@ planting)	pH FINAL (28 days after planting)
		# seeds germinated			# alive					
100%	A	3	4	4	5	5	5	5	7.1	7.1
	B	2	3	3	3	3	3	3		
	C	1	2	3	3	3	1	1		
	D	4	6	6	7	7	7→5	5		
	E	1	1	1	2	3	3	2		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 1 large + 4 medium plants in good condition

Replicate B: 1 medium + 1 small in good condition + 1 small w/ 1 green + 1 browning shoot + 1 small dead

Replicate C: 1 medium in good shape + 2 single shoot small dead

Replicate D: 1 large + 4 medium in good shape - 1 medium + 1 small plants w/ brown edges removed

Replicate E: 2 medium in good shape + 1 small, single shoot plant dead.

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 large 4 medium all look good

Replicate B: NS/S 2 small 1 very small 1 brown shoot on smaller one

Replicate C: NS/S 1 medium looks good

Replicate D: 3 medium 1 small look good

Replicate E: 2 medium shape plants look good

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# of Shoots
Replicate A	55 mm	75 mm	52 mm	48 mm	51 mm	6, 8, 13, 15, 14
Replicate B	31 mm	43 mm	12 mm	— mm	— mm	2, 4, 12
Replicate C	61 mm	— mm	— mm	— mm	— mm	16
Replicate D	76 mm	58 mm	65 mm	29 mm	35 mm	10, 9, 11, 12, 8
Replicate E	84 mm	72 mm	— mm	— mm	— mm	8, 14

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	989.24	1443.6	1073.98
Replicate B	1002.44	1073.4	1014.75
Replicate C	961.05	1076.1	986.85
Replicate D	1003.36	1312.7	1070.68
Replicate E	975.82	1154.5	1005.71

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	112 mm	mm	mm	mm	mm
Replicate B	100 mm	mm	mm	mm	mm
Replicate C	109 mm	mm	mm	mm	mm
Replicate D	101 mm	mm	mm	mm	mm
Replicate E	140 mm	mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	982.54	1685.7	1024.49
Replicate B	983.40	1122.6	998.50
Replicate C	1000.19	1202.5	1013.56
Replicate D	993.62	1455.7	1017.39
Replicate E	969.97	1254.1	981.99

Comments: 90 gl dry wt / rep

CETIS Test Summary

Report Date: 10 Mar-06 2:29 PM
Test Link: 15-3014-2283/B154202psc

Plant Chronic test — CH2M Hill

Test No:	05-1469-8332	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			
Comments:	E280101				

Sample No:	07-3307-9513	**Code:**	B1542-02	**Client:**	
Sample Date:	08 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	78d 0h	**Station:**			
Comments:	J10DV4, J10DV5, J10DV6, J10DV7, J10DV8. E280101				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-6946-3761	% Germination	100	> 100	N/A	37.51%	Equal Variance t Two-Sample
11-1021-9867	AG Average Dry Wt.	100	> 100	N/A	59.46%	Equal Variance t Two-Sample
02-0499-7537	AG Average Height	100	> 100	N/A	180.38%	Equal Variance t Two-Sample
11-9140-3004	AG Average Wet Wt.	100	> 100	N/A	49.90%	Equal Variance t Two-Sample
00-9602-9003	Root Average Dry Wt.	100	> 100	N/A	62.43%	Equal Variance t Two-Sample
11-9362-4518	Root Average Wet Wt.	100	> 100	N/A	55.35%	Equal Variance t Two-Sample
07-4060-8488	Total Average Biomass Dry	100	> 100	N/A	59.60%	Equal Variance t Two-Sample
17-5778-7616	Total Average Biomass Wet	100	> 100	N/A	51.32%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 2:29 PM
Test Link: 15-3014-2283/B154202psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.64000	0.20000	1.00000	0.16000	0.35777	55.90%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	14.852	4.1033	24.8	3.3228	7.4301	50.03%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	26.293	9.6667	61	10.287	23.003	87.49%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	76.157	23.653	115.05	15.595	34.870	45.79%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	6.9781	2.3667	13.37	1.8708	4.1833	59.95%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	122.76	46.4	202.31	25.995	58.126	47.35%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	21.830	6.47	38.17	5.1432	11.500	52.68%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	198.92	70.053	317.36	41.348	92.456	46.48%

CETIS Test Summary

Report Date: 10 Mar-06 2:29 PM
Test Link: 15-3014-2283/B154202psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		1.00000	0.60000	0.20000	1.00000	0.40000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		16.948	4.10333	24.8	13.4840	14.9450

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		11.2	9.66667	61	10.6	39

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		90.872	23.6533	115.05	61.868	89.34

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		8.39000	2.36666	13.37	4.75400	6.01001

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		130.632	46.4	202.31	92.416	142.065

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		25.3380	6.46999	38.17	18.2180	20.9550

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		221.504	70.0533	317.360	154.284	231.405

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:26 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	37.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.30924	1.85955	0.1134	0.37044	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1700585	0.170059	1	1.71	0.22680	Non-Significant Effect
Error	0.7936922	0.099212	8			
Total	0.96375073	0.2692700	9			

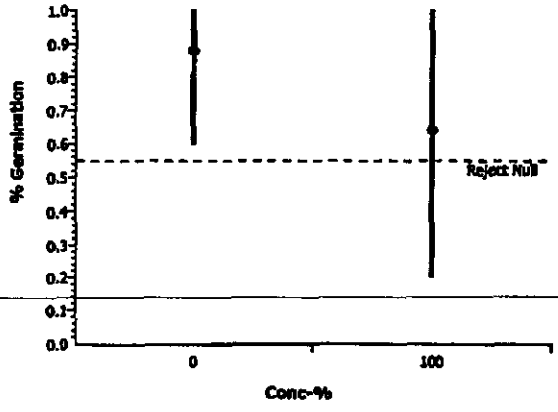
ANOVA Assumptions

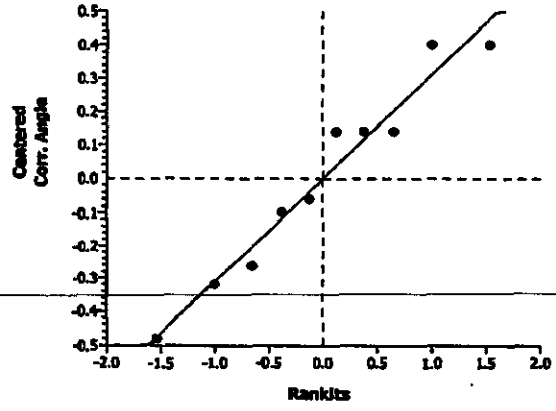
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.65997	23.15450	0.23677	Equal Variances
Distribution	Shapiro-Wilk W	0.94392		0.59737	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.64000	0.20000	1.00000	0.35777	0.94500	0.46365	1.34528	0.39477

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:28 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	59.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.6333	1.85955	0.7279	7.34419	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.64047	15.64047	1	0.40	0.54421	Non-Significant Effect
Error	311.963	38.99537	8			
Total	327.603419	54.635837	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.42296	23.15450	0.41235	Equal Variances
Distribution	Shapiro-Wilk W	0.98225		0.97606	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	14.852	4.1033	24.8	7.4301				

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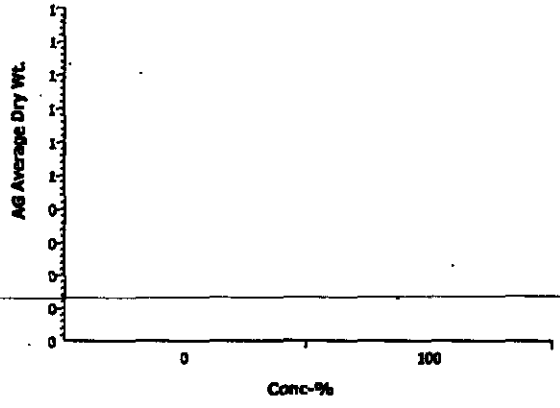

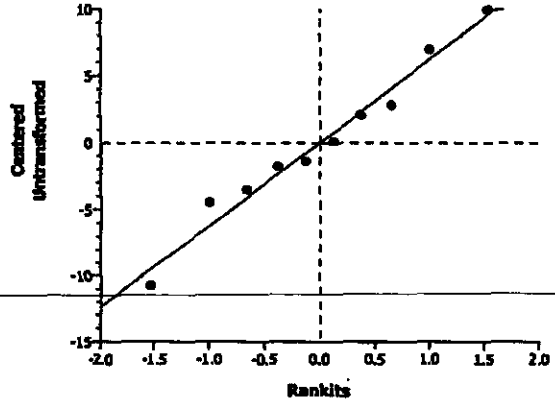

CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Height	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	180.38%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.5199	1.85955	0.9165	19.1681	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	613.6111	613.6111	1	2.31	0.16703	Non-Significant Effect
Error	2125.068	265.6335	8			
Total	2738.67944	879.24463	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	248.39520	23.15450	0.00010	Unequal Variances
Distribution	Shapiro-Wilk W	0.86082		0.07803	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		5	26.293	9.6667	61	23.003				

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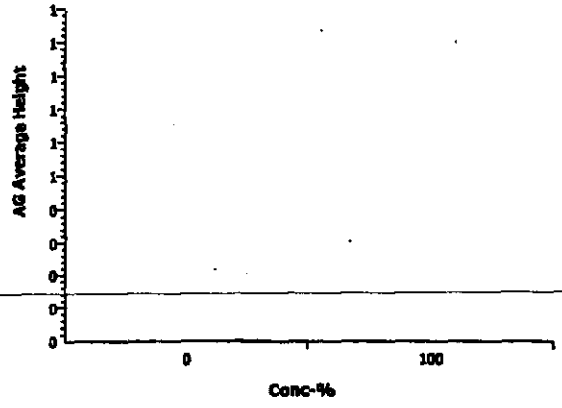
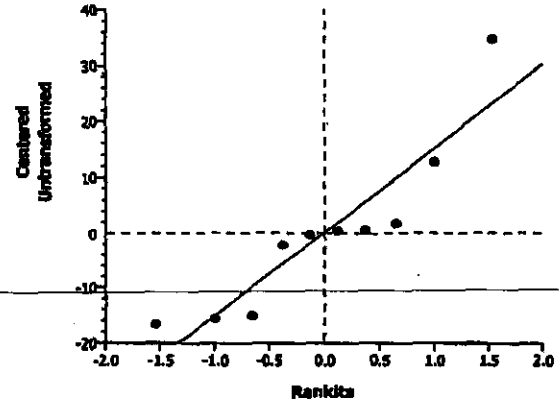




CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Wet Wt.	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:28 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	49.90%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.7146	1.85955	0.7524	31.8871	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	375.3645	375.3645	1	0.51	0.49519	Non-Significant Effect
Error	5880.917	735.1146	8			
Total	6256.28152	1110.4792	9			

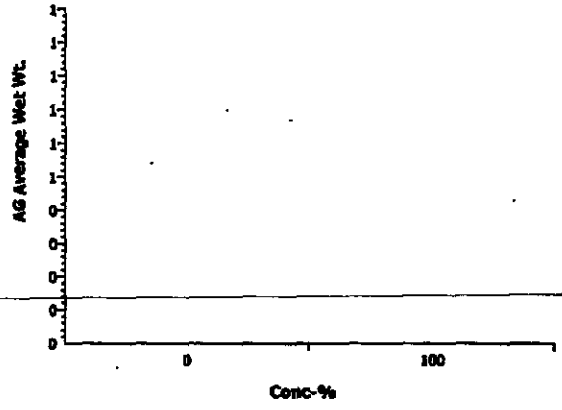
ANOVA Assumptions

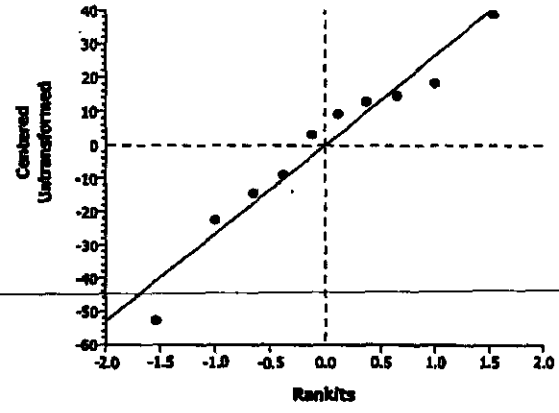
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.78193	23.15450	0.15878	Equal Variances
Distribution	Shapiro-Wilk W	0.95704		0.75167	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	76.157	23.653	115.05	34.870				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	62.43%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.33643	1.85955	0.3726	4.91076	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.973415	1.973415	1	0.11	0.74520	Non-Significant Effect
Error	139.4799	17.43499	8			
Total	141.45335	19.408407	9			

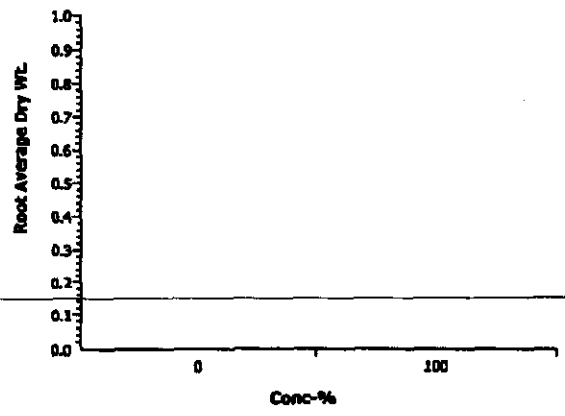
ANOVA Assumptions

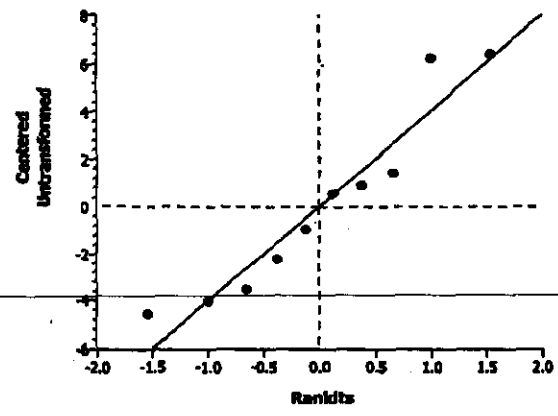
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00746	23.15450	0.99443	Equal Variances
Distribution	Shapiro-Wilk W	0.90289		0.23446	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	6.9781	2.3667	13.37	4.1833				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.35%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.2828	1.85955	0.6077	62.6698	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	227.0727	227.0727	1	0.08	0.78452	Non-Significant Effect
Error	22716	2839.5	8			
Total	22943.0766	3066.5732	9			

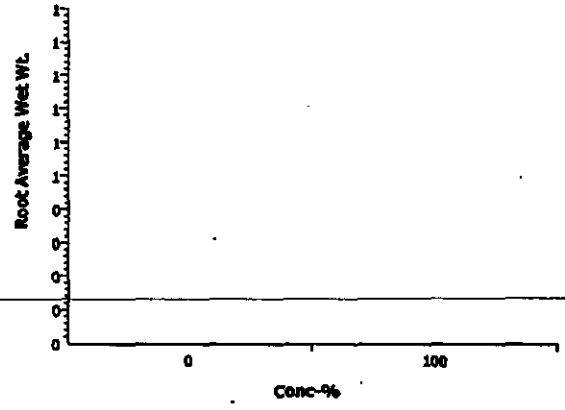
ANOVA Assumptions

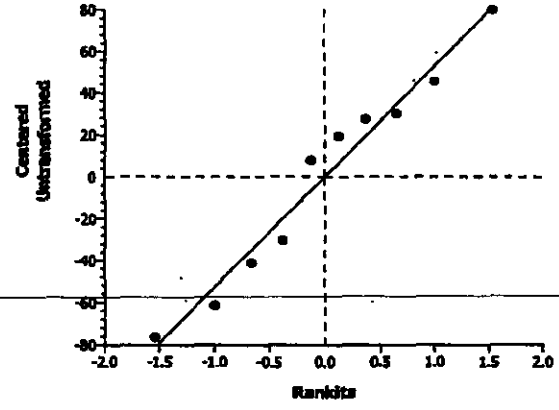
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.46872	23.15450	0.71863	Equal Variances
Distribution	Shapiro-Wilk W	0.95710		0.75234	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	122.76	46.4	202.31	58.126				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	15-3014-2283	15-3014-2283	10 Mar-06 2:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	59.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.2489	1.85955	0.5951	12.0486	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.502588	6.502588	1	0.06	0.80970	Non-Significant Effect
Error	839.6294	104.9537	8			
Total	846.131982	111.45626	9			

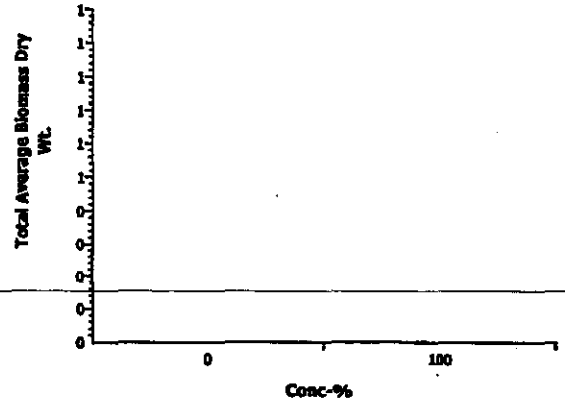
ANOVA Assumptions

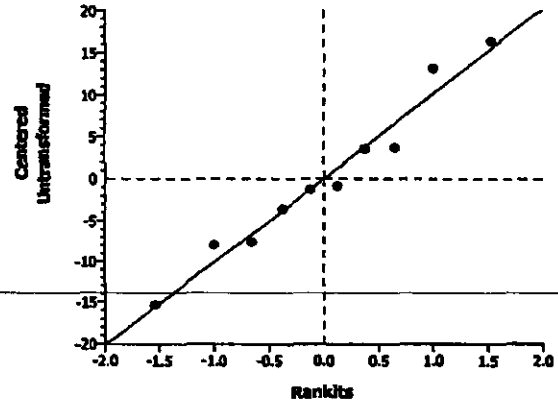
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.70337	23.15450	0.61853	Equal Variances
Distribution	Shapiro-Wilk W	0.96503		0.84128	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	21.830	6.47	38.17	11.500				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison		15-3014-2283	15-3014-2283	10 Mar-06 2:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	51.32%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.4456	1.85955	0.6661	90.9112	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1186.341	1186.341	1	0.20	0.66771	Non-Significant Effect
Error	47802.41	5975.302	8			
Total	48988.7550	7161.6427	9			

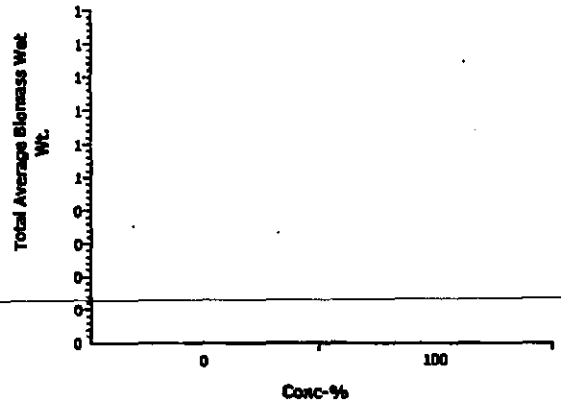
ANOVA Assumptions

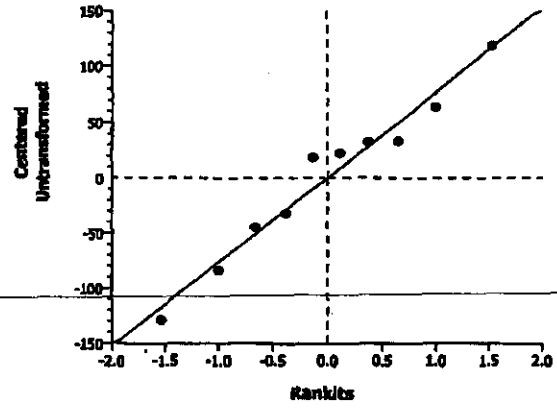
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51228	23.15450	0.39406	Equal Variances
Distribution	Shapiro-Wilk W	0.96972		0.88820	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	198.92	70.053	317.36	92.456				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 Br Day 12 NJ Day 14 Br Day 16 NJ Day 21 NJ Day 28 Br

Sample ID: E283101-SO12 B1542-03

CONC.	REPLICATE	# seeds germinated: PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (18 days after planting)	7-DAYS POST-EMERGENCE (21 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (28 days after planting)
					21 / 3	30		
100%	A	1	3	4	4 / 4	4	7.2	7.3
	B	4	5	5	6 / 6	6→5		
	C	3	3	4	4 / 4	3		
	D	2	2	3	4 / 4	4		
	E	3	4	4	4 / 4	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 medium + 1 small plant in good shape
Replicate B: 6 medium in good shape - smallest removed
Replicate C: 1 large + 2 medium in good shape + 1 single shoot dead
Replicate D: 3 medium + 1 small in good shape
Replicate E: 4 medium in good shape + 1 small single shoot plant w/ browning tip.

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 ~~4~~ NJ medium, all green & good shape, 1 small - good shape & green
Replicate B: 4 medium - all green & good shape
Replicate C: 1 large & 2 medium - all green & in good shape
Replicate D: 4 medium - all green & in good shape
Replicate E: 1 large, 3 medium - all green & in good shape. 1 small - w/ 1 brown shoot

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# of shoots
Replicate A	4/68 NJ mm	mm	mm	mm	mm	42
Replicate B	55 mm	mm	mm	mm	mm	76
Replicate C	74 mm	mm	mm	mm	mm	51
Replicate D	55 mm	mm	mm	mm	mm	37
Replicate E	69 mm	mm	mm	mm	mm	

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1003.62	1245.0	1049.42
Replicate B	1020.47	1473.4	1103.86
Replicate C	1018.98	1473.6	1110.39
Replicate D	1002.17	1302.4	1046.68
Replicate E	994.12	~~1473.4 NJ~~ 1377.3	1062.60

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	103 mm	mm	mm	mm	mm
Replicate B	105 mm	mm	mm	mm	mm
Replicate C	137 mm	mm	mm	mm	mm
Replicate D	136 mm	mm	mm	mm	mm
Replicate E	112 mm	mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	~~994.12~~ 1017.14	1556.2	1046.86
Replicate B	965.79	1826.7	1021.39
Replicate C	1015.00	1826.5	1064.27
Replicate D	991.78	1491.4	1015.98
Replicate E	1000.25	1801.0	1045.22

Comments: 35 g dry wt/rep

CETIS Test Summary

Report Date: 10 Mar-06 2:47 PM
Test Link: 11-6729-9100/B154203psc

Plant Chronic test — CH2M Hill

Test No:	08-7140-2504	Test Type:	Plant Chronic test	Duration:	37d 0h
Start Date:	25 Jan-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:	03 Mar-06	Dil Water:		Source:	
Setup Date:	25 Jan-06 12:00 AM	Brine:			
Comments:	E283101				

Sample No:	15-5457-5144	Code:	B1542-03	Client:	
Sample Date:	14 Nov-05	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	72d 0h	Station:			
Comments:	J10DT8, E283101				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
13-0598-5594	% Germination	100	> 100	N/A	22.60%	Equal Variance t Two-Sample
12-7925-4627	AG Average Dry Wt.	100	> 100	N/A	63.25%	Equal Variance t Two-Sample
05-9433-9153	AG Average Wet Wt.	100	> 100	N/A	50.83%	Equal Variance t Two-Sample
07-1842-1257	Root Average Dry Wt.	100	> 100	N/A	61.46%	Equal Variance t Two-Sample
12-8604-5268	Root Average Wet Wt.	100	> 100	N/A	55.58%	Equal Variance t Two-Sample
07-3498-2993	Total Average Biomass Dry	100	> 100	N/A	61.50%	Equal Variance t Two-Sample
03-3037-2496	Total Average Biomass Wet	100	> 100	N/A	51.72%	Equal Variance t Two-Sample

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	16.718	11.128	30.637	3.6185	8.0912	48.40%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	90.866	60.345	151.71	15.946	35.657	39.24%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	10.003	6.05	16.423	1.8129	4.0538	40.52%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	172.14	121.90	270.5	26.184	58.548	34.01%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	26.721	17.177	47.060	5.4021	12.079	45.21%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	263.01	195.11	422.21	41.799	93.465	35.54%

CETIS Test Summary

Report Date: 10 Mar-06 2:47 PM
Test Link: 11-6729-9100/B154203psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.80000	1.00000	0.60000	0.80000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82686	7.92751
100		11.4500	16.6780	30.6367	11.1275	13.696

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		60.3450	90.5860	151.707	75.0575	76.6360

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		7.42999	11.1200	16.4233	6.04999	8.99399

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		134.765	172.182	270.5	121.905	161.350

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		18.8800	27.7980	47.0600	17.1775	22.69

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		195.11	262.768	422.207	196.963	237.986

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:45 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	22.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.37677	1.85955	0.3581	0.23506	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0056708	0.005671	1	0.14	0.71614	Non-Significant Effect
Error	0.3195846	0.039948	8			
Total	0.3252554	0.0456189	9			

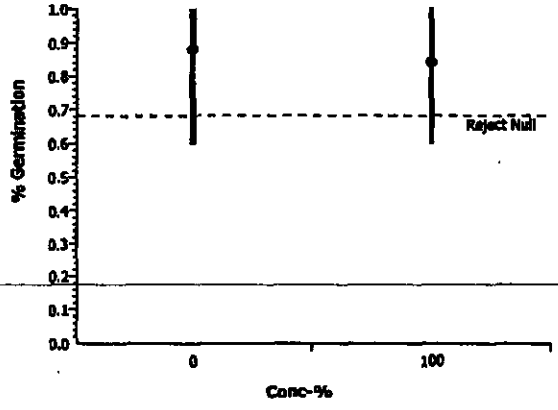
ANOVA Assumptions

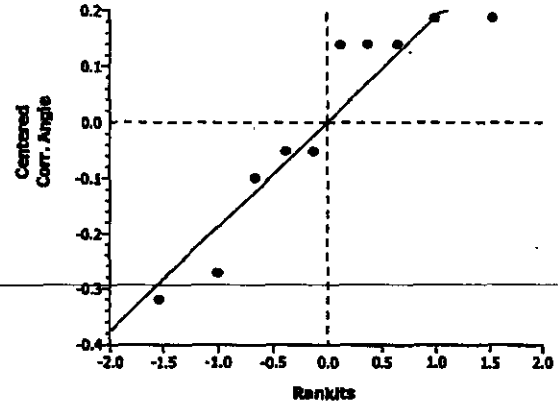
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.14108	23.15450	0.90131	Equal Variances
Distribution	Shapiro-Wilk W	0.85889		0.07404	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.84000	0.60000	1.00000	0.16733	1.15819	0.88608	1.34528	0.19317

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	63.25%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.0394	1.85955	0.8355	7.8124	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	47.67259	47.67259	1	1.08	0.32901	Non-Significant Effect
Error	353.0072	44.1259	8			
Total	400.679794	91.798492	9			

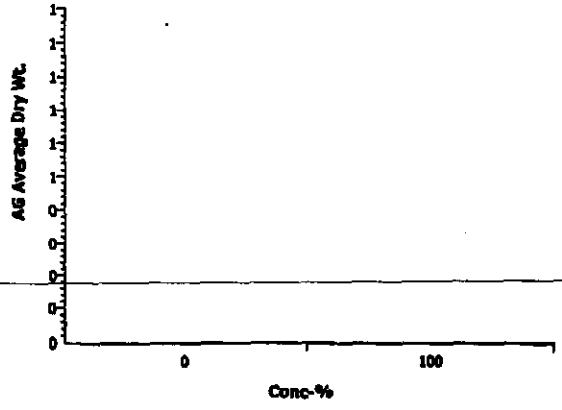
ANOVA Assumptions

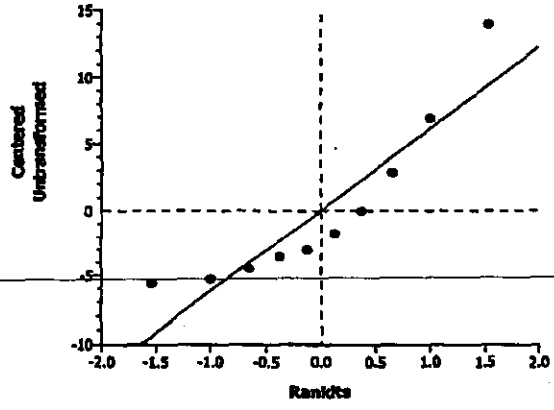
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.87331	23.15450	0.33110	Equal Variances
Distribution	Shapiro-Wilk W	0.84132		0.04576	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	16.718	11.128	30.637	8.0912				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	50.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.5436	1.85955	0.9194	32.4828	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1817.505	1817.505	1	2.38	0.16127	Non-Significant Effect
Error	6102.717	762.8397	8			
Total	7920.22266	2580.3450	9			

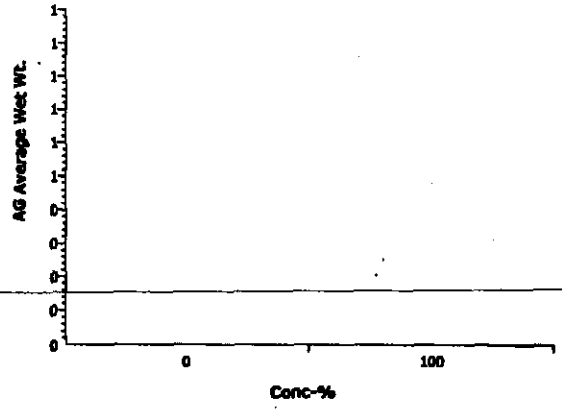
ANOVA Assumptions

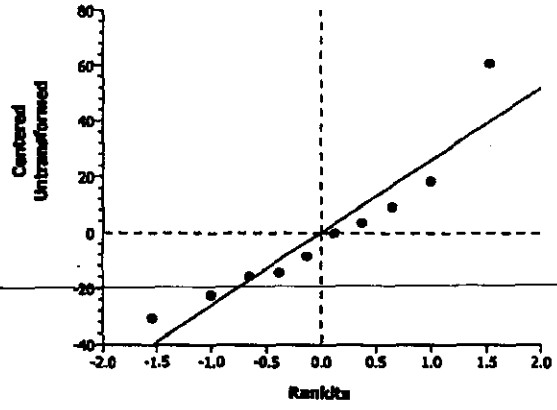
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.00000	23.15450	0.14815	Equal Variances
Distribution	Shapiro-Wilk W	0.89115		0.17471	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	90.866	60.345	151.71	35.657				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	61.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.8218	1.85955	0.7825	4.83508	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.41551	11.41551	1	0.68	0.43498	Non-Significant Effect
Error	135.2142	16.90177	8			
Total	146.629681	28.31728	9			

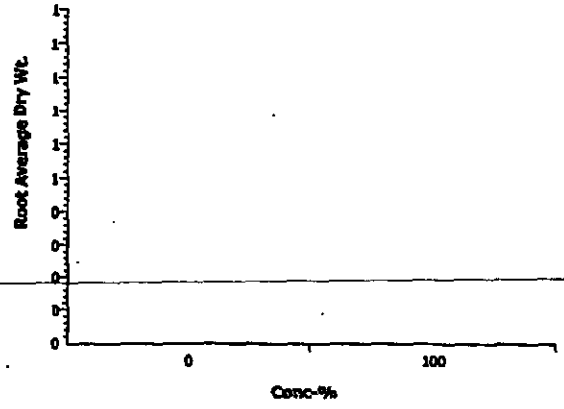
ANOVA Assumptions

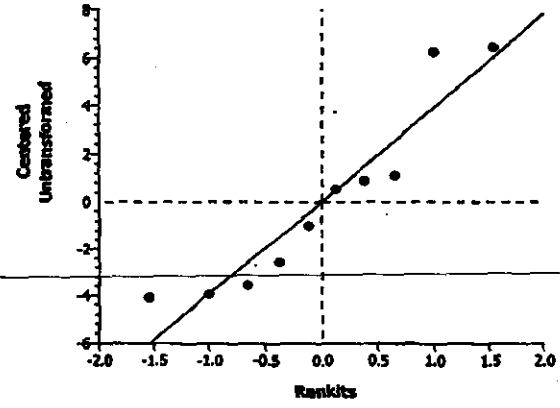
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.05701	23.15450	0.95844	Equal Variances
Distribution	Shapiro-Wilk W	0.87437		0.11238	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	10.003	6.05	16.423	4.0538				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.7403	1.85955	0.9400	62.9411	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8674.86	8674.86	1	3.03	0.11998	Non-Significant Effect
Error	22913.1	2864.138	8			
Total	31587.9619	11538.998	9			

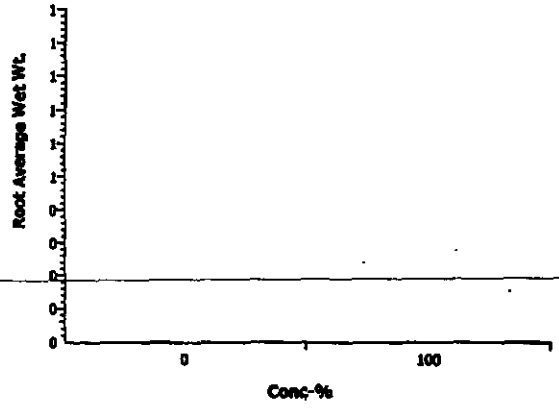
ANOVA Assumptions

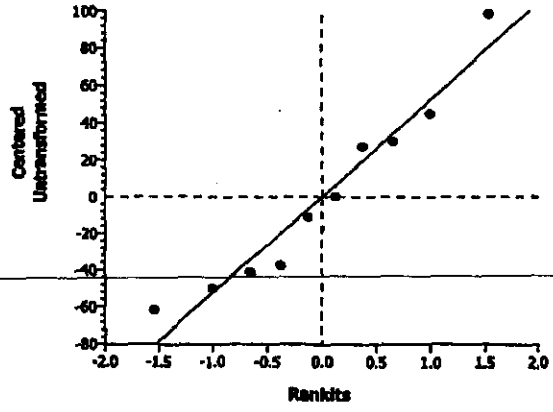
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.49014	23.15450	0.70857	Equal Variances
Distribution	Shapiro-Wilk W	0.94145		0.56924	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	172.14	121.91	270.5	58.548				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	61.50%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.9726	1.85955	0.8204	12.4342	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	105.7444	105.7444	1	0.95	0.35922	Non-Significant Effect
Error	894.2308	111.7788	8			
Total	999.975182	217.52325	9			

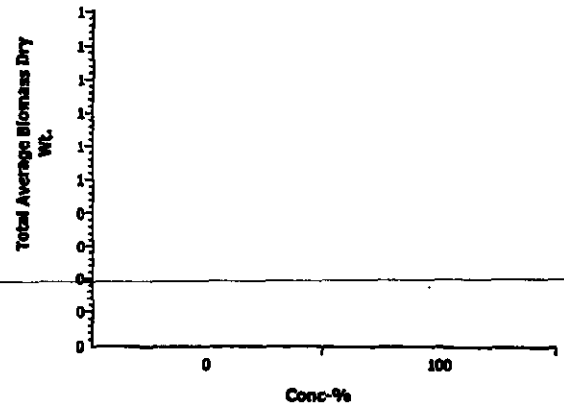
ANOVA Assumptions

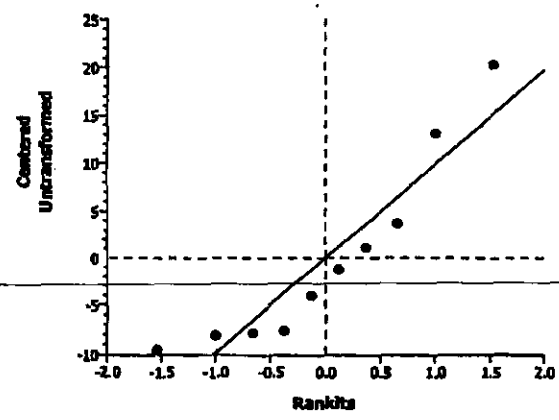
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.87917	23.15450	0.55620	Equal Variances
Distribution	Shapiro-Wilk W	0.86171		0.07992	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	26.721	17.177	47.060	12.079				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	11-6729-9100	11-6729-9100	10 Mar-06 2:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	51.72%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.7428	1.85955	0.9402	91.6218	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	18433.81	18433.81	1	3.04	0.11954	Non-Significant Effect
Error	48552.59	6069.074	8			
Total	66986.4004	24502.881	9			

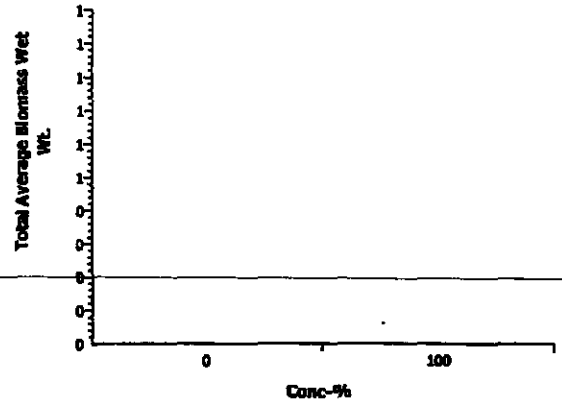
ANOVA Assumptions

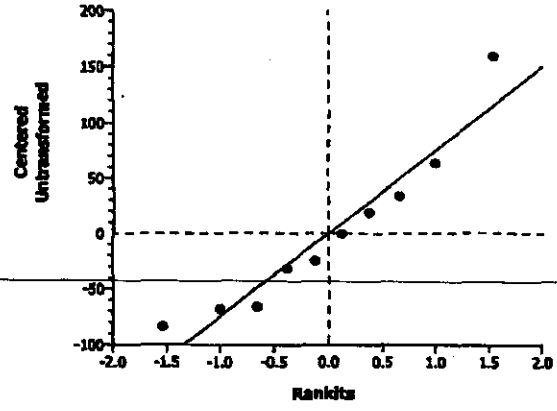
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.56740	23.15450	0.38336	Equal Variances
Distribution	Shapiro-Wilk W	0.92031		0.35952	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	263.01	195.11	422.21	93.465				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2008

Initials: Day 0 Bm Day 12 NS Day 14 Bm Day 18 NS Day 21 (RD) Day 30 Bm

Sample ID: E284601-SOI2 31542-[illegible]04										
		# seeds germinated							pH	
CONC.	REPLICATE	PRE-EMERGENCE (12 days after planting)	EMERGENCE (14 days after planting)	POST-EMERGENCE (18 days after planting)	21	7-DAYS POST-EMERGENCE (21 days after planting) 23	30	14-DAYS POST-EMERGENCE (28 days after planting)	INITIAL (0 planting)	FINAL (28 days after planting)
100%	A	2	2	NS 3	5	5	3	3	6.5	7.1
	B	0	2	3	4	4	4	3		
	C	0	1	2	2	2	2	2		
	D	3	6	7	7	7	5	5		
	E	0	1	2	6	7	7→5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 medium plants in good shape (color + 2 small brown plants (single shoot)

Replicate B: 1 medium + 1 small/medium w/ good color + 1 small/medium and 1 small w/ brown edges (still alive)

Replicate C: 2 medium plants in good shape w/ good color

Replicate D: 4 medium in good shape + 1 small w/ 1 green and 1 brown shoot, other small plants brown.

Replicate E: 1 large + 4 medium in good shape, 2 small single shoot plants in good shape removed

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 medium plants look good

Replicate B: 3 medium plants look good

Replicate C: 2 medium plants look good

Replicate D: 3-4 med. 1 large plant look good

Replicate E: 1 large plant 4 medium plants look good, 1 small plant

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# Shoots
Replicate A	40 mm	49 mm	48 mm	— mm	— mm	6, 11, 11
Replicate B	40 mm	40 mm	51 mm	— mm	— mm	4, 12, 4
Replicate C	60 mm	40 mm	— mm	— mm	— mm	9, 9
Replicate D	20 mm	41 mm	50 mm	62 mm	39 mm	2, 13, 13, 12, 7
Replicate E	42 mm	45 mm	50 mm	62 mm	106 mm	6, 4, 10, 8, 12

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	993.35	1180.7	1027.52
Replicate B	1015.99	1156.0	1013.68
Replicate C	995.41	1112.9	1015.98
Replicate D	996.70	1287.8	1057.81
Replicate E	999.42	1332.6	1056.72

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	137 mm	125 mm	126 mm	mm	mm
Replicate B	144 mm	96 mm	107 mm	mm	mm
Replicate C	157 mm	136 mm	mm	mm	mm
Replicate D	138 mm	131 mm	158 mm	102 mm	27 mm
Replicate E	122 mm	127 mm	125 mm	78 mm	96 mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	975.91	1323.6	995.68
Replicate B	992.17	1233.4	1010.81
Replicate C	998.33	1212.3	1012.18
Replicate D	991.57	1491.2	1024.03
Replicate E	1006.36	1515.1	1040.11

Comments: 90 days st. /rep

CETIS Test Summary

Report Date: 10 Mar-06 3:09 PM
Test Link: 08-5372-9401/B154204psc

Plant Chronic test — **CH2M Hill**

Test No:	09-9175-7411	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			

Sample No:	09-5315-2344	**Code:**	B1542-04	**Client:**	
Sample Date:	15 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	71d 0h	**Station:**			

Comments: J10DV2, E284601

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
01-9254-1231	% Germination	100	> 100	N/A	29.92%	Equal Variance t Two-Sample
13-9253-1008	AG Average Dry Wt.	100	> 100	N/A	32.76%	Equal Variance t Two-Sample
16-7224-0566	AG Average Height	100	> 100	N/A	49.51%	Equal Variance t Two-Sample
13-7546-9439	AG Average Wet Wt.	100	> 100	N/A	22.90%	Equal Variance t Two-Sample
07-9665-2596	Root Average Dry Wt.	100	> 100	N/A	44.15%	Equal Variance t Two-Sample
02-2440-4958	Root Average Length	100	> 100	N/A	62.01%	Equal Variance t Two-Sample
05-2473-0552	Root Average Wet Wt.	100	> 100	N/A	36.51%	Equal Variance t Two-Sample
05-1227-1695	Total Average Biomass Dry	100	> 100	N/A	36.53%	Equal Variance t Two-Sample
06-6783-3595	Total Average Biomass Wet	100	> 100	N/A	28.88%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 3:09 PM
Test Link: 08-5372-9401/B154204psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.72000	0.40000	1.00000	0.12000	0.26833	37.27%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	10.669	9.2133	11.46	0.4217	0.9429	8.84%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	15.12	8.4	25	2.7527	6.1553	40.71%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	58.544	46.670	66.636	3.3307	7.4477	12.72%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	6.5947	6.2133	6.925	0.1202	0.2689	4.08%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	28.46	22.5	33	1.7486	3.91	13.74%
100		5	39.773	22	73	9.3283	20.859	52.44%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	100.99	80.410	115.9	5.8455	13.071	12.94%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	17.264	15.427	18.21	0.4928	1.1019	6.38%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	159.54	127.08	178.35	8.7345	19.531	12.24%

CETIS Test Summary

Report Date: 10 Mar-06 3:09 PM
Test Link: 08-5372-9401/B154204psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.60000	0.60000	0.40000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		11.3900	9.21334	10.2600	11.0220	11.46

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		15.3333	14.6667	25	8.4	12.2

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		62.45	46.6700	58.7450	58.2200	66.6360

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		6.59334	6.21334	6.92499	6.49200	6.75

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	27.8	28.4	30.6	33	22.5
100		43	38.6667	73	22.2	22

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		115.897	80.4100	106.985	99.926	101.748

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		17.9834	15.4267	17.185	17.5140	18.21

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		178.347	127.080	165.730	158.146	168.384

CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	29.92%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.08340	1.85955	0.1551	0.30265	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0777281	0.077728	1	1.17	0.31020	Non-Significant Effect
Error	0.529773	0.066222	8			
Total	0.60750108	0.1439497	9			

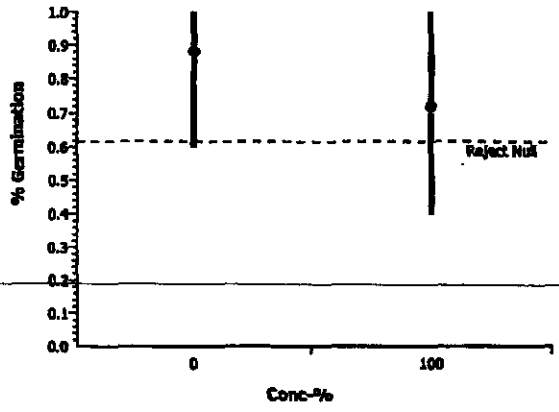
ANOVA Assumptions

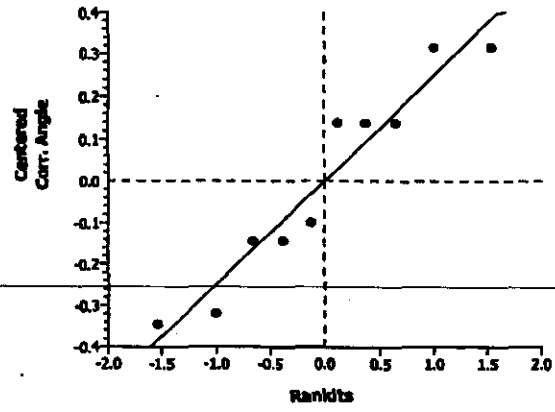
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.11043	23.15450	0.48725	Equal Variances
Distribution	Shapiro-Wilk W	0.90642		0.25730	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.72000	0.40000	1.00000	0.26833	1.02949	0.68472	1.34528	0.29977

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	32.76%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.77289	1.85955	0.2309	4.04627	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.070768	7.070768	1	0.60	0.46181	Non-Significant Effect
Error	94.69466	11.83683	8			
Total	101.765432	18.907601	9			

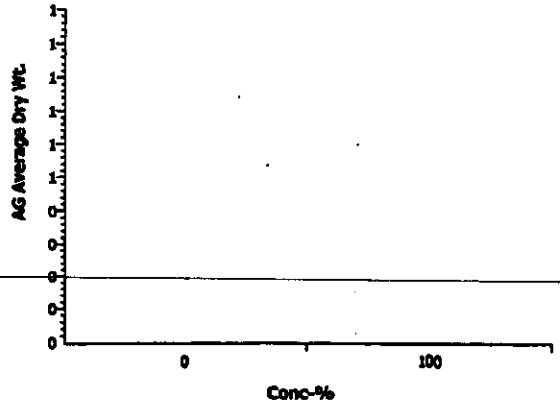
ANOVA Assumptions

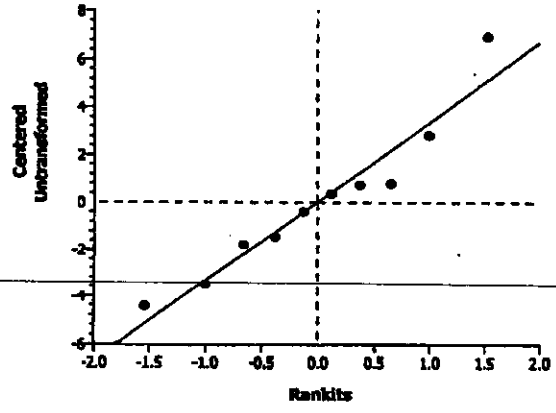
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	25.62671	23.15450	0.00825	Unequal Variances
Distribution	Shapiro-Wilk W	0.94329		0.59015	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	10.669	9.2133	11.46	0.9429				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Height	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	49.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.5883	1.85955	0.9246	5.26077	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	50.47511	50.47511	1	2.52	0.15089	Non-Significant Effect
Error	160.0711	20.00889	8			
Total	210.546219	70.484001	9			

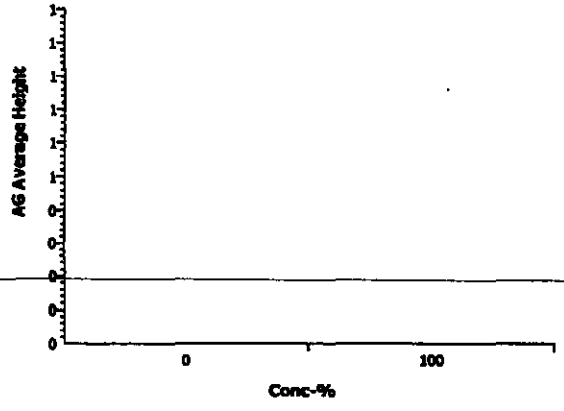
ANOVA Assumptions

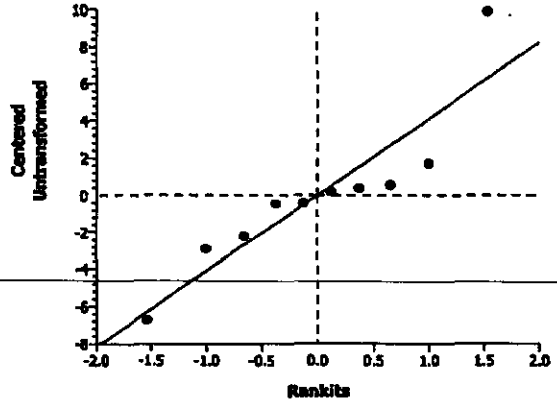
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	17.78573	23.15450	0.01640	Equal Variances
Distribution	Shapiro-Wilk W	0.86589		0.08951	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		5	15.12	8.4	25	6.1553				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	22.90%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.68088	1.85955	0.2576	14.6362	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	71.79871	71.79871	1	0.46	0.51517	Non-Significant Effect
Error	1238.995	154.8743	8			
Total	1310.79346	226.67305	9			

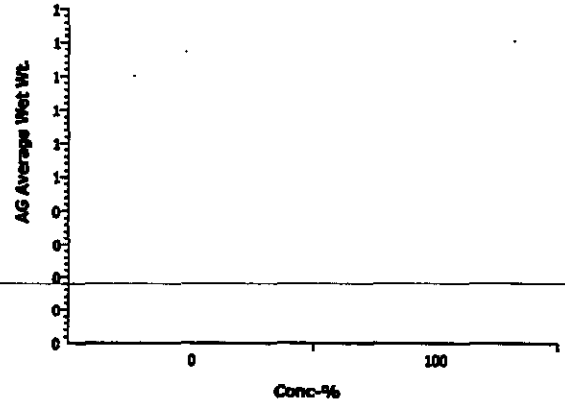
ANOVA Assumptions

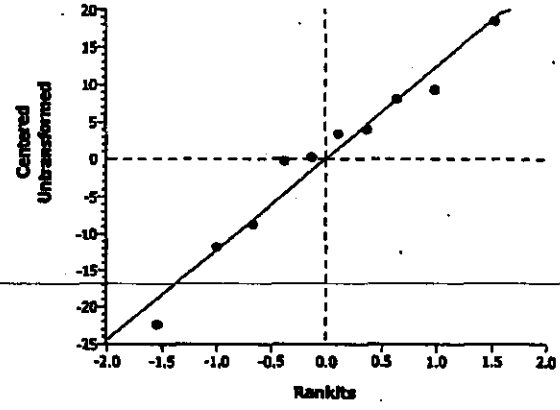
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.58421	23.15450	0.16944	Equal Variances
Distribution	Shapiro-Wilk W	0.96988		0.86975	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	58.544	46.67	66.636	7.4477				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed	-	100	>100	1	N/A	44.15%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.68096	1.85955	0.2576	3.47318	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.044082	4.044082	1	0.46	0.51512	Non-Significant Effect
Error	69.77014	8.721268	8			
Total	73.8142233	12.765349	9			

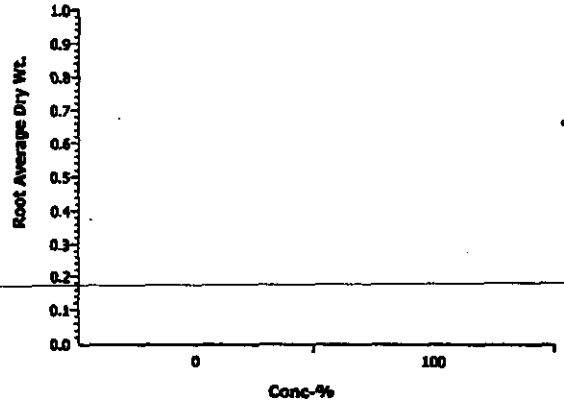
ANOVA Assumptions

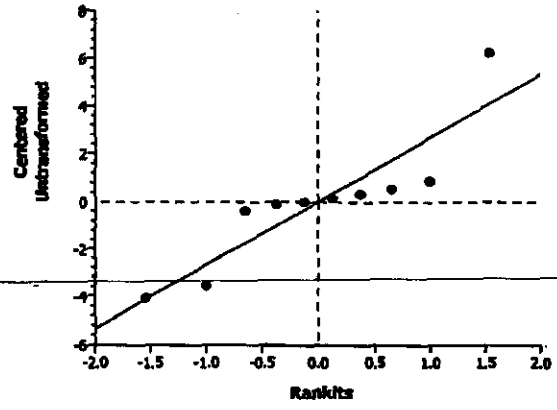
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	240.25800	23.15450	0.00010	Unequal Variances
Distribution	Shapiro-Wilk W	0.83816		0.04194	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	6.5947	6.2133	6.925	0.2689				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t.Two-Sample	C > T	Untransformed		100	>100	1	N/A	62.01%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.1920	1.85955	0.8663	17.6486	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	319.9788	319.9788	1	1.42	0.26741	Non-Significant Effect
Error	1801.513	225.1891	8			
Total	2121.49173	545.16791	9			

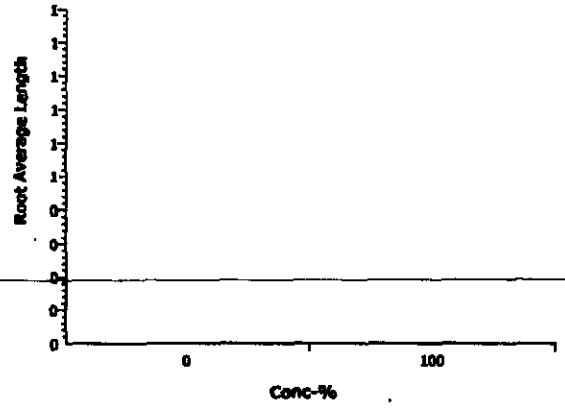
ANOVA Assumptions

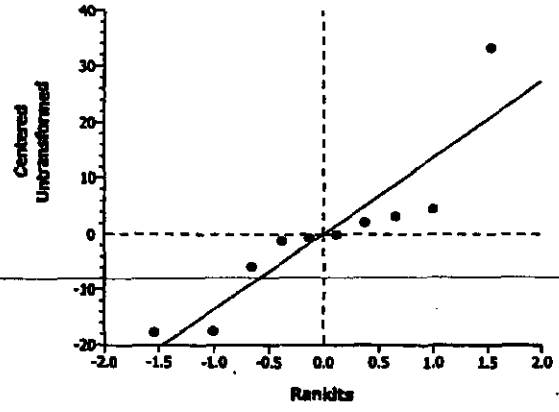
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	28.45959	23.15450	0.00676	Unequal Variances
Distribution	Shapiro-Wilk W	0.84109		0.04547	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	28.46	22.5	33	3.91				
100		5	39.773	22	73	20.859				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.55061	1.85955	0.2985	41.3408	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	374.6069	374.6069	1	0.30	0.59693	Non-Significant Effect
Error	9884.932	1235.616	8			
Total	10259.5385	1610.2234	9			

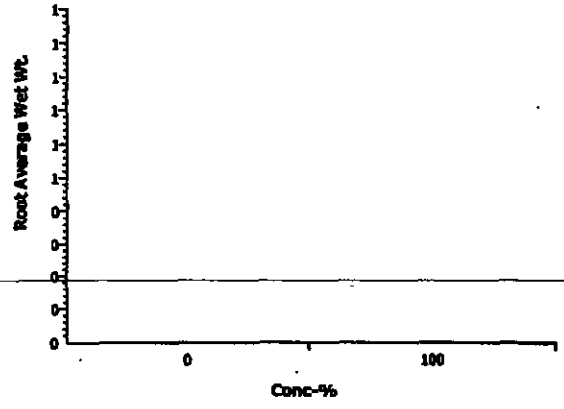
ANOVA Assumptions

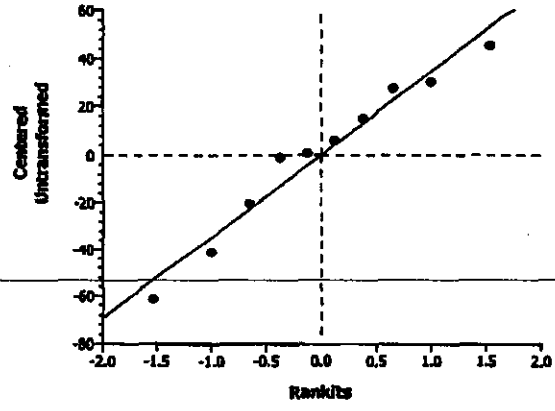
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	13.46452	23.15450	0.02736	Equal Variances
Distribution	Shapiro-Wilk W	0.95666		0.74721	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	100.99	80.410	115.9	13.071				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.53%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.74372	1.85955	0.2392	7.38505	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	21.80978	21.80978	1	0.55	0.47832	Non-Significant Effect
Error	315.4434	39.43043	8			
Total	337.253202	61.24021	9			

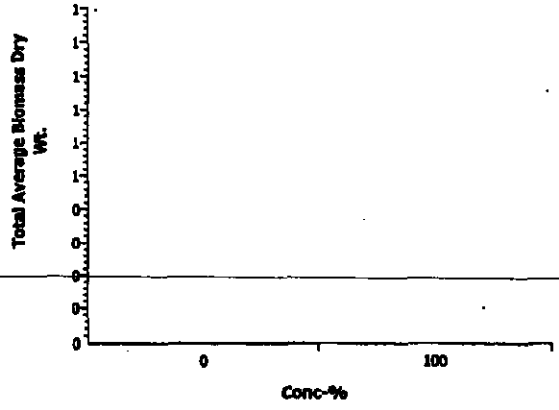
ANOVA Assumptions

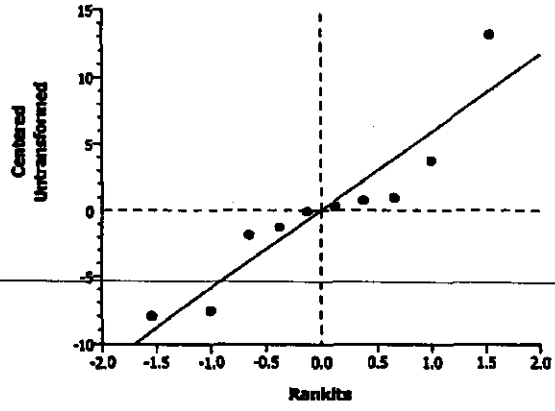
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	63.94633	23.15450	0.00141	Unequal Variances
Distribution	Shapiro-Wilk W	0.88617		0.15347	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	17.264	15.427	18.21	1.1019				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	08-5372-9401	08-5372-9401	10 Mar-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	28.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.63977	1.85955	0.2701	51.156	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	774.4072	774.4072	1	0.41	0.54020	Non-Significant Effect
Error	15135.88	1891.985	8			
Total	15910.2910	2666.3927	9			

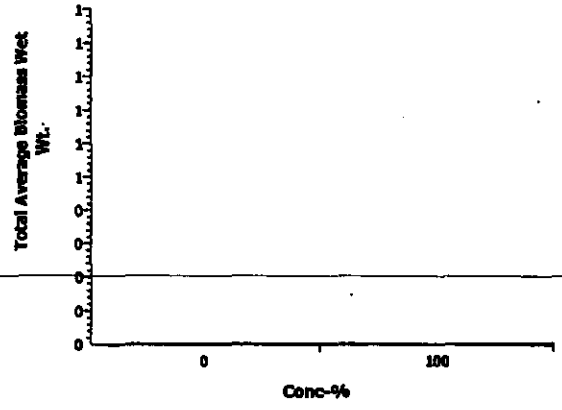
ANOVA Assumptions

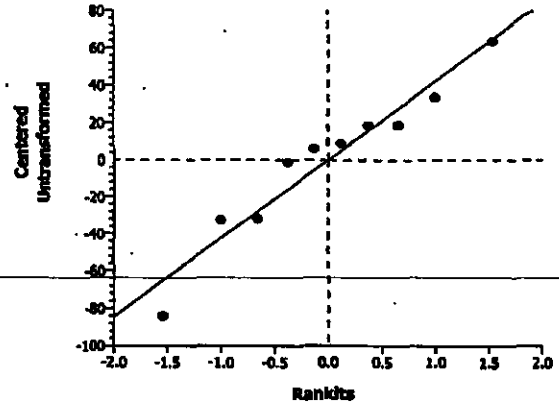
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.91986	23.15450	0.05688	Equal Variances
Distribution	Shapiro-Wilk W	0.94991		0.66738	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	159.54	127.08	178.35	19.531				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 Br Day 12 NJ Day 14 Br Day 16 MS Day 21 (SO) Day 26 Br

Sample ID: E284701-SOI2 B5942-05

CONC.	REPLICATE	PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting) 12		7-DAYS POST-EMERGENCE (21 days after planting) 23 30		14-DAYS POST-EMERGENCE (28 days after planting)	INITIAL (@ planting)	FINAL (28 days after planting)
		# seeds germinated total live							pH	
100%	A	0	1	4	4	4	1	1	6.8	7.2
	B	1	3	4	4	4	2	2		
	C	0	2	4	5	5	5	4		
	D	0	2	3	3	3	2	2		
	E	0	0	0	1	1	0	0		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 1 medium plant in good shape + 3 small, brown dead plants

Replicate B: 1 medium in good shape + 1 medium w/ 4 green + 1 brown shoots + 3 dead single shoot plants

Replicate C: 3 medium in good shape + 1 small w/ 2 green + 1 brown + 1 small single shoot turning brown

Replicate D: 2 medium w/ 1 brown and 3 green shoots + 1 brown, dead, small plant

Replicate E: 1 single shoot dead plant

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 small plant, 2 brown shoots – 5 good shoots 7 total shoots

Replicate B: ~~1~~ 1 small & 1 medium plant med plant 3 brown shoots

Replicate C: 3 small 1 medium plant each plant has 1 brown shoot

Replicate D: 2 small plants 1 has only 1 green shoot, other has 1 brown shoot

Replicate E: No plants

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# Shoots
Replicate A	34 mm	~~65~~ MS mm	MS 28 mm	— mm	— mm	6
Replicate B	65 mm	36 mm	MS 66 mm	— mm	— mm	9 8
Replicate C	28 mm	66 mm	MS 36 34 mm	40 mm	— mm	4, 6, 5, 7
Replicate D	55 mm	25 mm	MS 40 mm	— mm	— mm	4, 5
Replicate E	— mm	— mm	— mm	— mm	— mm	

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1008.22	1039.2	1013.46
Replicate B	984.32	1060.0	1000.82
Replicate C	998.06	1116.6	1024.08
Replicate D	1006.64	1056.6	1020.26
Replicate E	1012.09	—	—

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	95 mm	mm	mm	mm	mm
Replicate B	125 mm	96 mm	mm	mm	mm
Replicate C	97 mm	120 mm	43 mm	73 mm	mm
Replicate D	92 mm	81 mm	mm	mm	mm
Replicate E	mm	mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	993.37	1035.6	995.94
Replicate B	1007.69	1145.2	1019.39
Replicate C	1039.63	1153.1	1047.71
Replicate D	988.21	1037.4	993.97
Replicate E	1005.00	—	—

Comments:

CETIS Test Summary

Report Date: 10 Mar-06 3:15 PM
Test Link: 13-6207-2802/B154205psc

Plant Chronic test — **CH2M Hill**

Test No:	09-7340-6761	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			

Sample No:	06-5742-9955	**Code:**	B1542-05	**Client:**	
Sample Date:	15 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	71d 0h	**Station:**			

Comments: J10DV1, E284701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-4134-0539	% Germination	< 100	100	N/A	31.94%	Equal Variance t Two-Sample
04-0388-4068	AG Average Dry Wt.	< 100	100	N/A	38.05%	Equal Variance t Two-Sample
12-9304-8505	AG Average Height	100	> 100	N/A	109.58%	Unequal Variance t Two-Sample
15-3320-8767	AG Average Wet Wt.	< 100	100	N/A	24.95%	Equal Variance t Two-Sample
05-6551-5720	Root Average Dry Wt.	< 100	100	N/A	54.04%	Equal Variance t Two-Sample
16-8795-0081	Root Average Length	100	> 100	N/A	129.59%	Unequal Variance t Two-Sample
01-1714-1452	Root Average Wet Wt.	< 100	100	N/A	43.27%	Equal Variance t Two-Sample
07-9043-1977	Total Average Biomass Dry	< 100	100	N/A	43.45%	Equal Variance t Two-Sample
17-6925-3080	Total Average Biomass Wet	< 100	100	N/A	33.77%	Equal Variance t Two-Sample

CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	31.94%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	3.31955	1.85955	0.0053	0.3208	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.8198639	0.819864	1	11.02	0.01055	Significant Effect
Error	0.5952135	0.074402	8			
Total	1.41507733	0.8942655	9			

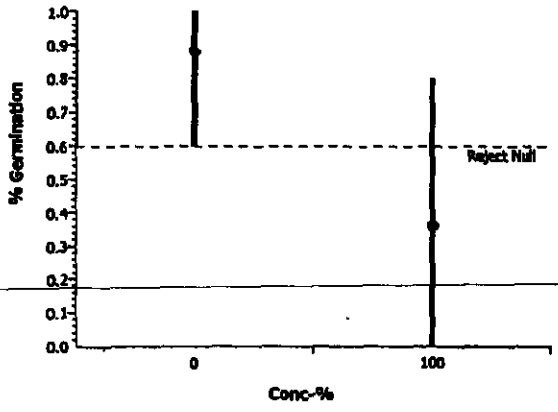
ANOVA Assumptions

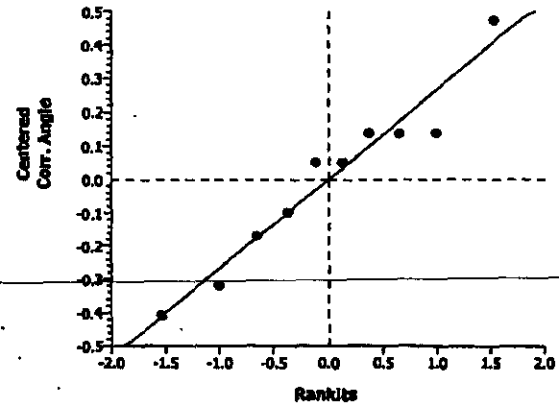
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.49465	23.15450	0.39757	Equal Variances
Distribution	Shapiro-Wilk W	0.95095		0.67970	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.36000	0.00000	0.80000	0.29665	0.63315	0.22551	1.10715	0.32592

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.27746	1.89458	0.0284	4.69977	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	70.92812	70.92812	1	5.19	0.05685	Non-Significant Effect
Error	95.72236	13.67462	7			
Total	166.650482	84.602746	8			

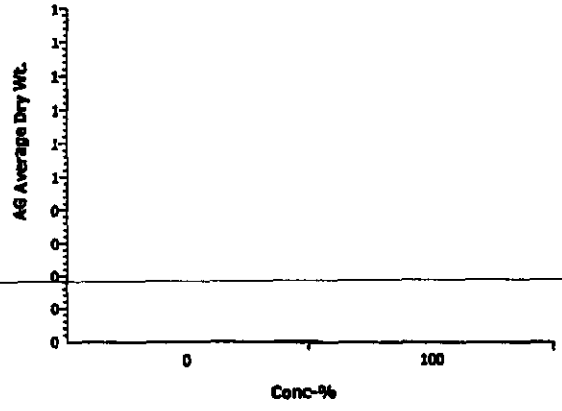
ANOVA Assumptions

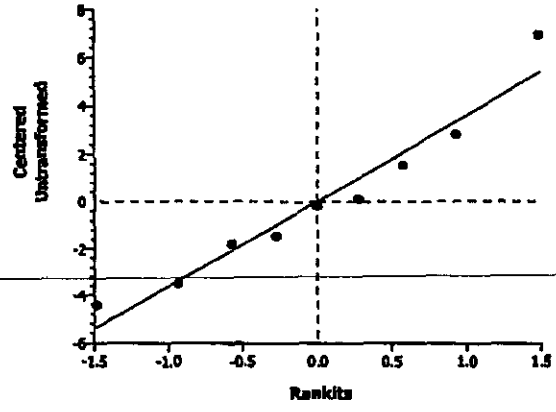
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	14.91113	46.19462	0.05089	Equal Variances
Distribution	Shapiro-Wilk W	0.95295		0.72240	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		4	6.7013	5.2401	8.25	1.2361				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Height	Comparison		13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Unequal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	109.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-2.3743	2.35336	0.9509	11.6446	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	306.7185	306.7185	1	7.22	0.03119	Significant Effect
Error	297.2084	42.45834	7			
Total	603.926910	349.17688	8			

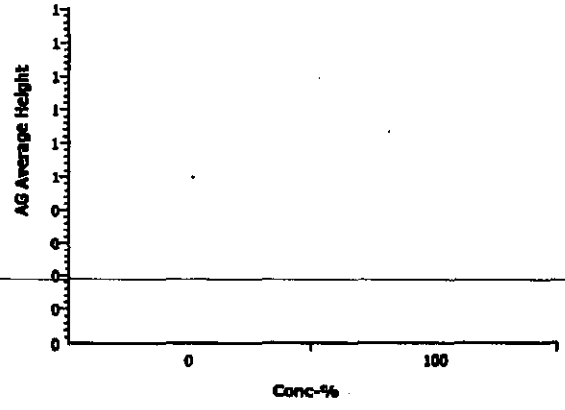
ANOVA Assumptions

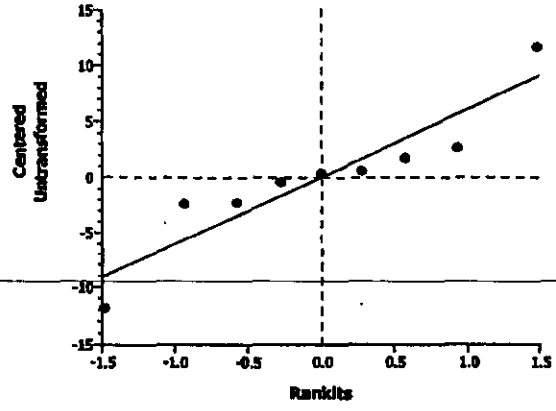
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	45.17330	24.25912	0.00305	Unequal Variances
Distribution	Shapiro-Wilk W	0.89720		0.23620	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		4	22.375	10.5	34	9.8096				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	24.95%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	3.92614	1.89458	0.0029	15.9458	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2426.535	2426.535	1	15.41	0.00570	Significant Effect
Error	1101.93	157.4186	7			
Total	3528.46484	2583.9533	8			

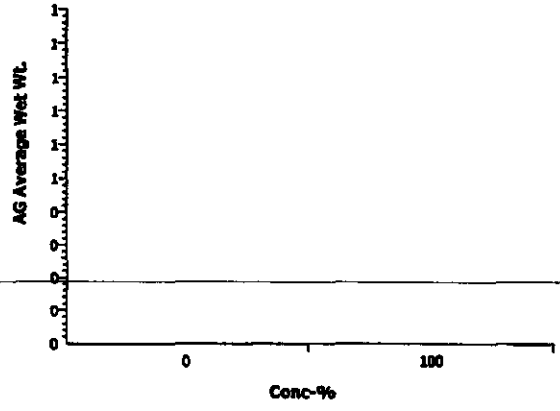
ANOVA Assumptions

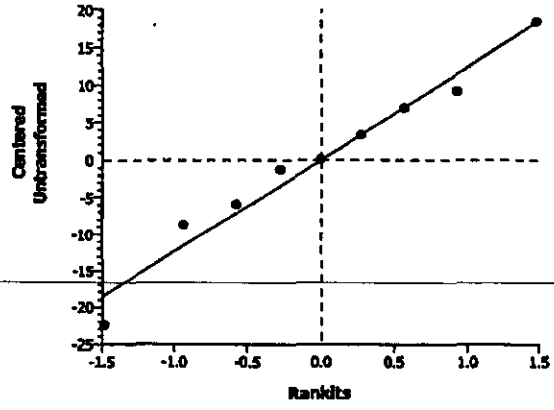
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.99470	46.19462	0.10183	Equal Variances
Distribution	Shapiro-Wilk W	0.98165		0.97222	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		4	30.859	24.98	37.84	5.317				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	54.04%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.0217	1.89458	0.0415	4.25136	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	45.73503	45.73503	1	4.09	0.08292	Non-Significant Effect
Error	78.32761	11.18966	7			
Total	124.062641	56.924686	8			

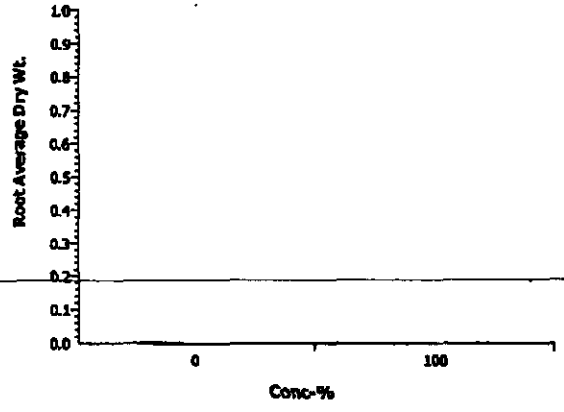
ANOVA Assumptions

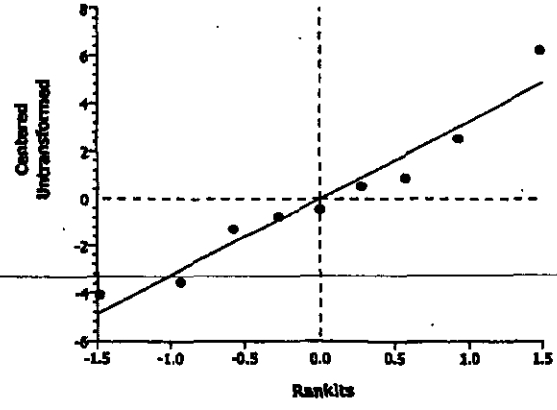
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.89043	46.19462	0.17693	Equal Variances
Distribution	Shapiro-Wilk W	0.94719		0.65928	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		4	3.33	2.02	5.8500	1.7172				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Unequal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	129.59%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.5141	2.35336	0.8864	36.8805	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1251.098	1251.098	1	2.95	0.12973	Non-Significant Effect
Error	2971.574	424.5106	7			
Total	4222.67236	1675.6089	8			

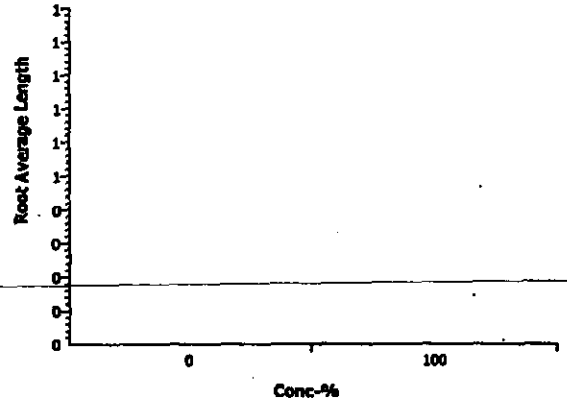
ANOVA Assumptions

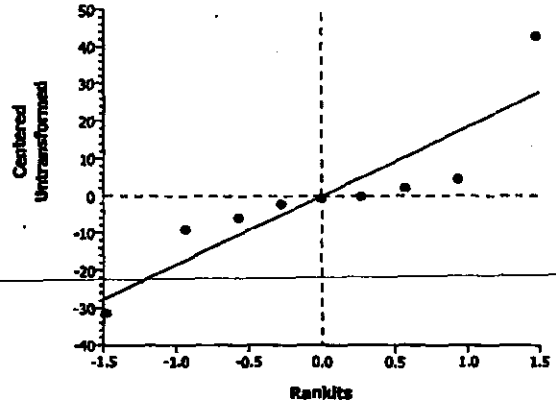
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	63.45765	24.25912	0.00158	Unequal Variances
Distribution	Shapiro-Wilk W	0.84021		0.05806	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	28.46	22.5	33	3.91				
100		4	52.188	20.75	95	31.147				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	43.27%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.79386	1.89458	0.0134	48.9926	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11599.27	11599.27	1	7.81	0.02676	Significant Effect
Error	10402.09	1486.014	7			
Total	22001.3672	13085.286	8			

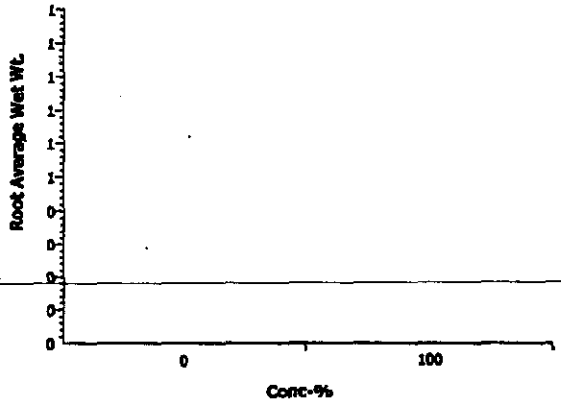
ANOVA Assumptions

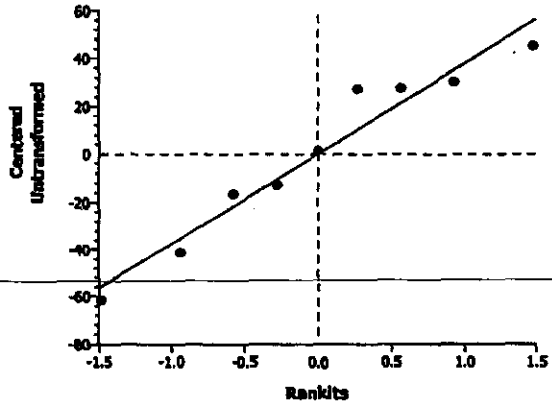
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.74830	46.19462	0.18247	Equal Variances
Distribution	Shapiro-Wilk W	0.93481		0.52849	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		4	40.987	24.595	68.755	20.005				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	43.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	2.19676	1.89458	0.0320	8.78501	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	230.5735	230.5735	1	4.83	0.06404	Non-Significant Effect
Error	334.4602	47.78003	7			
Total	565.033722	278.35357	8			

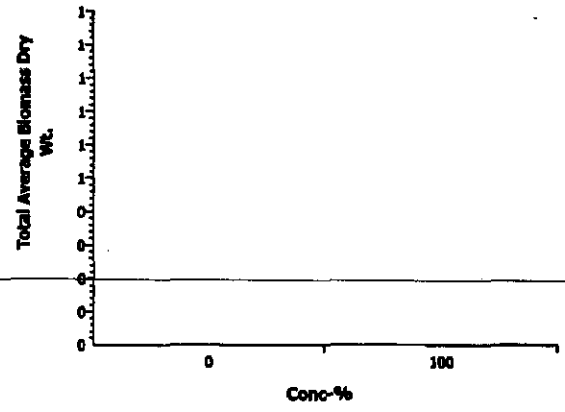
ANOVA Assumptions

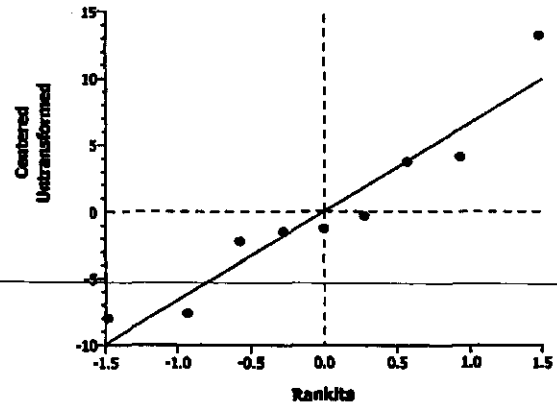
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	9.75715	46.19462	0.09127	Equal Variances
Distribution	Shapiro-Wilk W	0.91888		0.38302	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		4	10.031	7.8101	14.100	2.821				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	13-6207-2802	13-6207-2802	10 Mar-06 3:15 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.77%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	3.33482	1.89458	0.0063	59.8184	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	24636.38	24636.38	1	11.12	0.01251	Significant Effect
Error	15507.06	2215.294	7			
Total	40143.4365	26851.673	8			

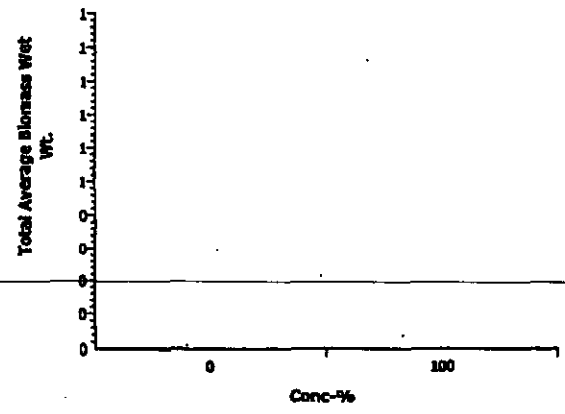
ANOVA Assumptions

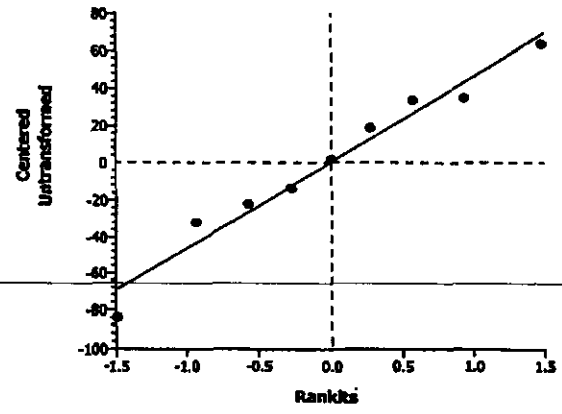
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.38092	46.19462	0.19823	Equal Variances
Distribution	Shapiro-Wilk W	0.97138		0.90629	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		4	71.846	49.575	106.59	25.146				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 [illegible] Day 12 NJ Day 14 [illegible] Day 16 [illegible] Day 21 [illegible] Day 28 [illegible]

Sample ID: E285701-SOI2 D 1542-06

CONC.	REPLICATE	# seeds germinated: PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	7-DAYS POST-EMERGENCE (21 days after planting)			14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (28 days after planting)
					# alive 21	23	30			
100%	A	1	2	3	5	5	1	1	7.3	7.3
	B	0	5	5	5	6	5	5		
	C	5	5	5	6	6	6→5	5		
	D	2	4	5*	5*	5*	4	3		
	E	0	1	2	3	4	2	2		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 1 medium plant in good shape + 4 single or double shoot plants turned brown.

Replicate B: 4 medium + 2 small in good shape (green color / multiple shoots) - 1 small removed

Replicate C: 4 medium in good shape + 1 medium w/ 3 green shoots + 2 brown shoots. 1 small brown removed

Replicate D: 3 medium in good shape + 1 small brown

Replicate E: 2 medium in good shape + 2/3 small brown

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 large - good color - no brown

Replicate B: 4 medium, 1 small - good color

Replicate C: 4 medium good color - no brown - 1 small w/ 4 brown shoots + 1 green

Replicate D: 3 medium - good color + 1 dead

Replicate E: 2 medium - both w/ browning tips on a couple of green shoots

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# shoots
Replicate A	64 mm	mm	mm	mm	mm	7
Replicate B	46 mm	36 mm	22 mm	42 mm	47 mm	8, 12, 4, 5, 9
Replicate C	39 mm	41 mm	44 mm	46 mm	10 mm	10, 10, 13, 10, 1
Replicate D	60 mm	40 mm	67 mm	mm	mm	8, 11, 10
Replicate E	46 mm	35 mm	mm	mm	mm	10, 9

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1002.83	1113.5	1011.77
Replicate B	1008.30	1191.2	1043.83
Replicate C	998.00	1253.8	1046.67
Replicate D	1002.13	1201.0	1034.73
Replicate E	1005.79	1080.6	1021.71

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	148 mm	mm	mm	mm	mm
Replicate B	94 mm	100 mm	94 mm	95 mm	55 mm
Replicate C	40 mm	97 mm	101 mm	136 mm	105 mm
Replicate D	114 mm	102 mm	106 mm	mm	mm
Replicate E	123 mm	77 mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	958.26	1056.2	964.50
Replicate B	966.35	1292.9	986.11
Replicate C	1000.09	1455.5	1030.67
Replicate D	992.46	1304.1	1006.98
Replicate E	1002.78	1131.3	1011.75

Comments: 90 grams dry wt / rep.

* Rep D day 30. 1 of the 5 counted as germinated on days 16, 21, 23 was identified as a separate species (20 cm tall on day 30). Removed on day 30

CETIS Test Summary

Report Date: 10 Mar-06 3:23 PM
Test Link: 07-9195-5290/B154206psc

Plant Chronic test — **CH2M Hill**

Test No:	07-6986-0052	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			

Sample No:	09-1115-2498	**Code:**	B1542-06	**Client:**	
Sample Date:	16 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	70d 0h	**Station:**			

Comments: J10DV3, E285701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-2321-5437	% Germination	100	> 100	N/A	37.51%	Equal Variance t Two-Sample
08-9561-0800	AG Average Dry Wt.	100	> 100	N/A	33.63%	Equal Variance t Two-Sample
04-9053-6328	AG Average Height	100	> 100	N/A	183.12%	Wilcoxon Rank Sum Two-Sample
06-0459-7695	AG Average Wet Wt.	100	> 100	N/A	44.89%	Equal Variance t Two-Sample
01-6453-5889	Root Average Dry Wt.	100	> 100	N/A	45.34%	Equal Variance t Two-Sample
10-1742-7543	Root Average Length	100	> 100	N/A	158.61%	Wilcoxon Rank Sum Two-Sample
06-1157-1082	Root Average Wet Wt.	100	> 100	N/A	37.75%	Equal Variance t Two-Sample
06-4473-5543	Total Average Biomass Dry	100	> 100	N/A	37.33%	Equal Variance t Two-Sample
10-6246-4792	Total Average Biomass Wet	100	> 100	N/A	34.83%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 3:23 PM
Test Link: 07-9195-5290/B154206psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.64000	0.20000	1.00000	0.16000	0.35777	55.90%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	8.9213	7.106	10.867	0.6582	1.4718	16.50%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	23.733	7.2	64	10.445	23.355	98.40%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	60.421	36.58	110.67	13.681	30.591	50.63%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	5.1266	3.9520	6.24	0.4523	1.0114	19.73%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	28.46	22.5	33	1.7486	3.91	13.74%
100		5	54.093	17.6	148	24.212	54.139	100.08

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	84.544	64.510	103.88	8.2686	18.489	21.87%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	14.048	11.058	15.850	0.9693	2.1673	15.43%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	144.97	101.89	208.61	20.496	45.832	31.62%

CETIS Test Summary

Report Date: 10 Mar-06 3:23 PM
Test Link: 07-9195-5290/B154206psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.20000	1.00000	1.00000	0.60000	0.40000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		8.94000	7.10599	9.73401	10.8667	7.96002

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		64	7.8	7.2	18.6667	21

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		110.67	36.58	51.1600	66.2900	37.405

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		6.23999	3.95200	6.11600	4.83999	4.48499

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	27.8	28.4	30.6	33	22.5
100		148	17.6	19.2	35.6667	50

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		97.9399	65.3100	91.082	103.88	64.5100

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		15.18	11.058	15.8500	15.7066	12.4450

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		208.61	101.890	142.242	170.17	101.915

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	37.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.30924	1.85955	0.1134	0.37044	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1700585	0.170059	1	1.71	0.22680	Non-Significant Effect
Error	0.7936922	0.099212	8			
Total	0.96375073	0.2692700	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.65997	23.15450	0.23677	Equal Variances
Distribution	Shapiro-Wilk W	0.94392		0.59737	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.64000	0.20000	1.00000	0.35777	0.94500	0.46365	1.34528	0.39477

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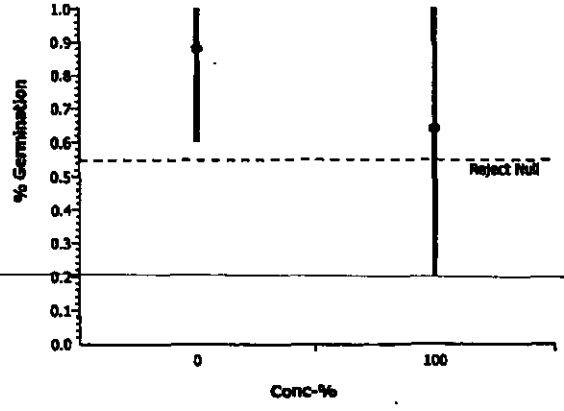

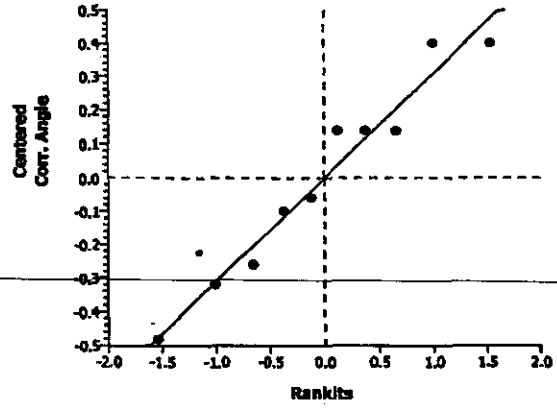

CETIS Analysis Detail

Plant Chronic test — **CH2M HIII**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.53523	1.85955	0.0816	4.15398	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	29.40357	29.40357	1	2.36	0.16328	Non-Significant Effect
Error	99.80294	12.47537	8			
Total	129.206511	41.878938	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.51840	23.15450	0.04261	Equal Variances
Distribution	Shapiro-Wilk W	0.95529		0.73115	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	8.9213	7.106	10.867	1.4718				

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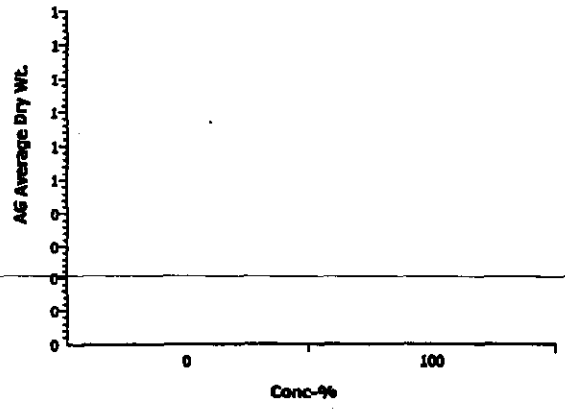
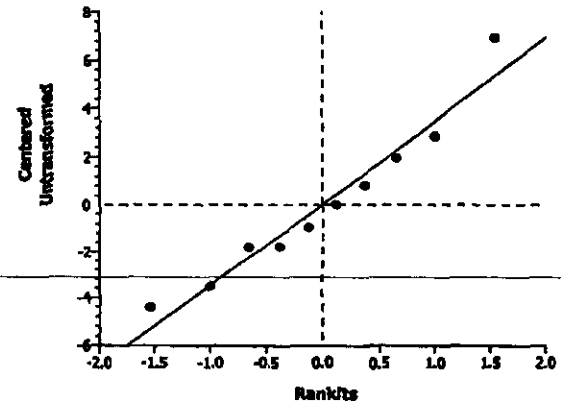




CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Height	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	183.12%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Dilution Water		100	30		0.6548	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	429.4618	429.4618	1	1.57	0.24578	Non-Significant Effect
Error	2190.29	273.7862	8			
Total	2619.75159	703.24802	9			

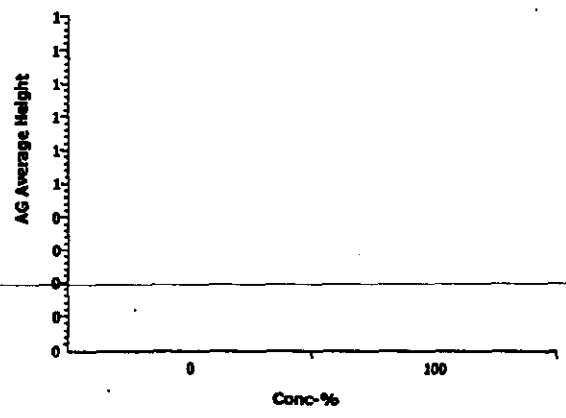
ANOVA Assumptions

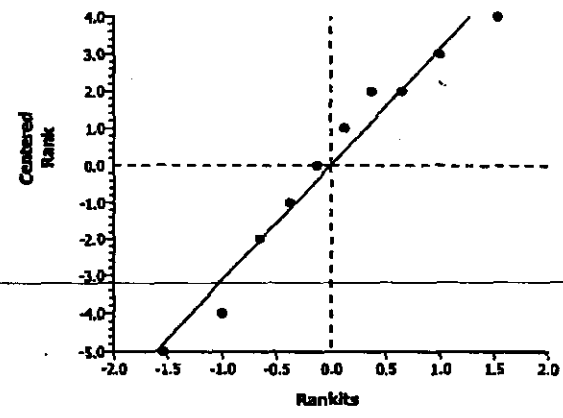
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	256.04940	23.15450	0.00009	Unequal Variances
Distribution	Shapiro-Wilk W	0.73242		0.00218	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595	5.00000	3.00000	7.00000	1.58114
100		5	23.733	7.2	64	23.355	6.00000	1.00000	10.0000	4.18330

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed	.	100	>100	1	N/A	44.89%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.22571	1.85955	0.4135	28.689	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	30.31542	30.31542	1	0.05	0.82709	Non-Significant Effect
Error	4760.421	595.0527	8			
Total	4790.73680	625.36809	9			

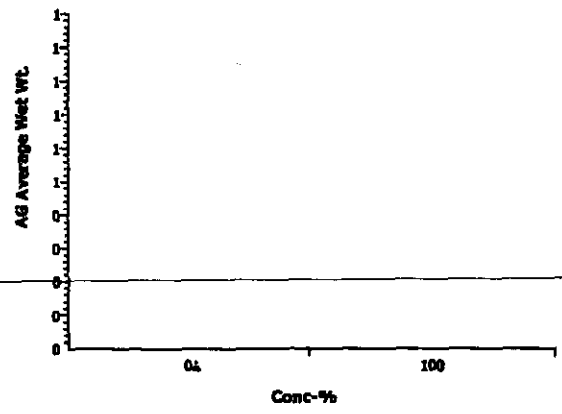
ANOVA Assumptions

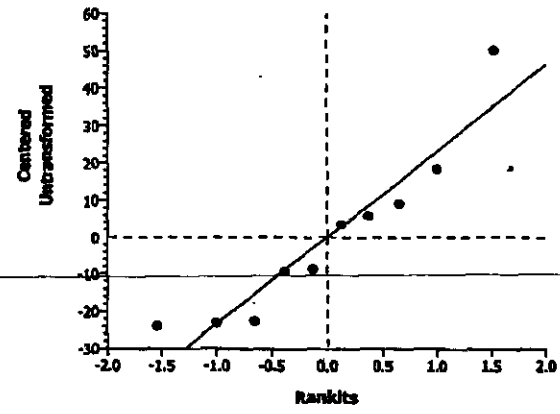
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.68029	23.15450	0.23489	Equal Variances
Distribution	Shapiro-Wilk W	0.89548		0.19531	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	60.421	36.58	110.67	30.591				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Dry Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	45.34%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.42859	1.85955	0.0955	3.56658	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	18.76904	18.76904	1	2.04	0.19098	Non-Significant Effect
Error	73.573	9.196625	8			
Total	92.3420410	27.965668	9			

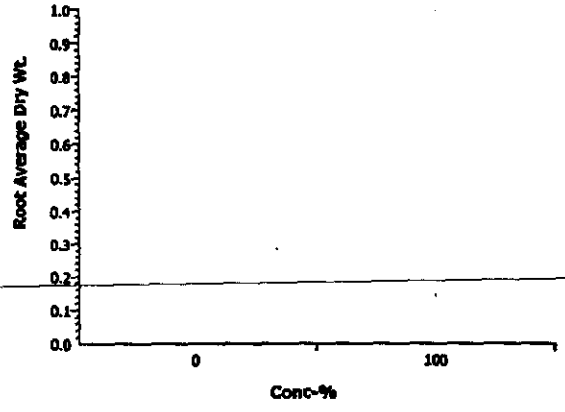
ANOVA Assumptions

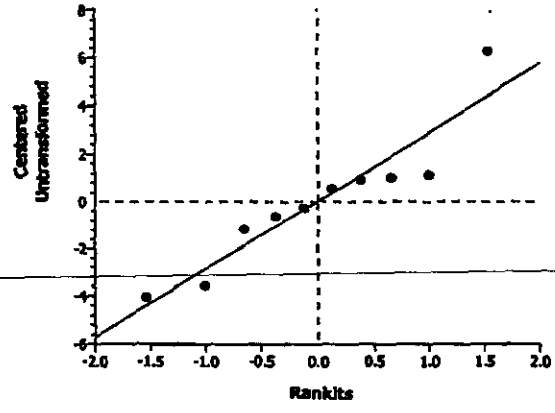
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	16.97948	23.15450	0.01787	Equal Variances
Distribution	Shapiro-Wilk W	0.90304		0.23651	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	5.1266	3.9520	6.24	1.0114				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	158.61%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Dilution Water		100	30		0.6548	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1642.669	1642.669	1	1.12	0.32183	Non-Significant Effect
Error	11785.22	1473.152	8			
Total	13427.8892	3115.8219	9			

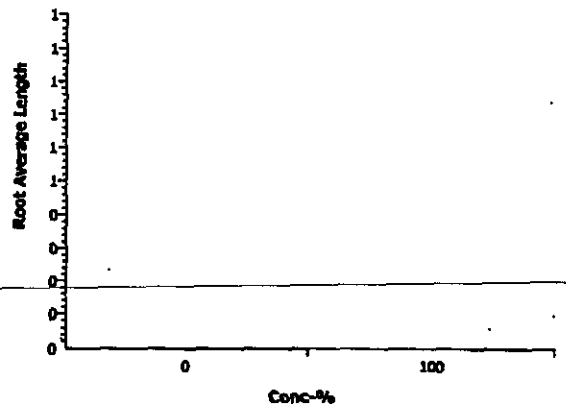
ANOVA Assumptions

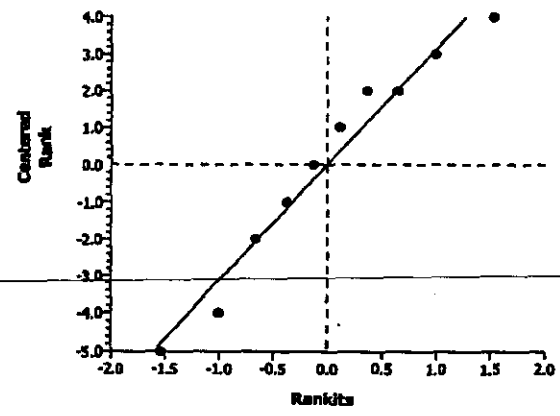
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	191.72010	23.15450	0.00016	Unequal Variances
Distribution	Shapiro-Wilk W	0.73476		0.00233	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	28.46	22.5	33	3.91	5.00000	3.00000	7.00000	1.58114
100		5	54.093	17.6	148	54.139	6.00000	1.00000	10.0000	4.18330

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:23 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.75%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.24804	1.85955	0.1237	42.7472	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2057.758	2057.758	1	1.56	0.24731	Non-Significant Effect
Error	10568.92	1321.115	8			
Total	12626.6821	3378.8738	9			

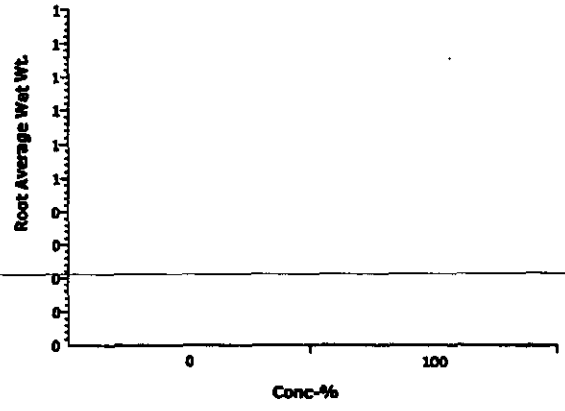
ANOVA Assumptions

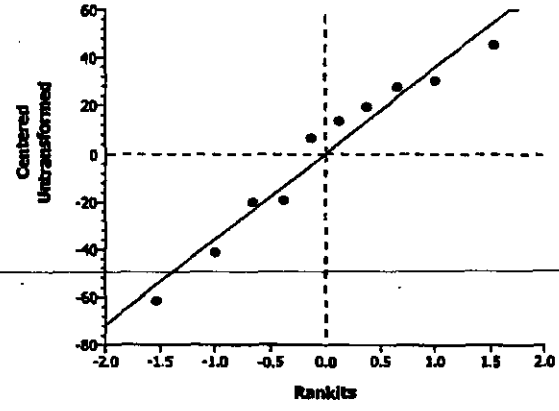
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.72930	23.15450	0.09177	Equal Variances
Distribution	Shapiro-Wilk W	0.94554		0.61618	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.838	158.52	47.962				
100		5	84.544	64.510	103.88	18.489				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:23 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.52026	1.85955	0.0835	7.54637	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	95.15679	95.15679	1	2.31	0.16693	Non-Significant Effect
Error	329.3759	41.17199	8			
Total	424.532677	136.32878	9			

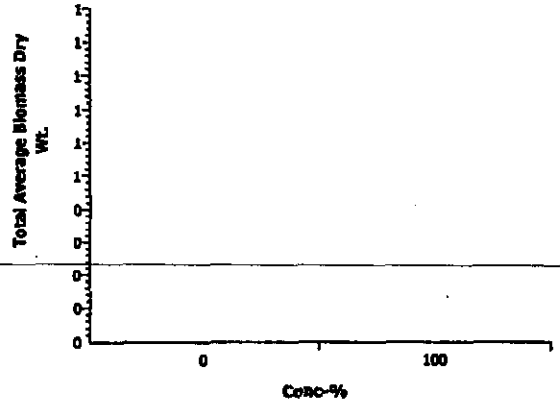
ANOVA Assumptions

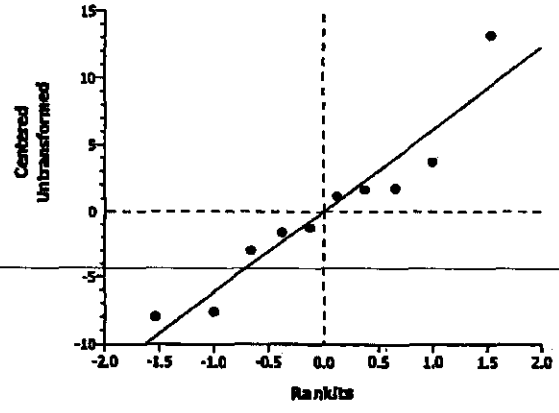
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	16.52981	23.15450	0.01878	Equal Variances
Distribution	Shapiro-Wilk W	0.91804		0.34089	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	14.048	11.058	15.850	2.1673				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison	07-9195-5290	07-9195-5290	10 Mar-06 3:23 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.96975	1.85955	0.1803	61.6913	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2587.601	2587.601	1	0.94	0.36057	Non-Significant Effect
Error	22012.2	2751.524	8			
Total	24599.7961	5339.1252	9			

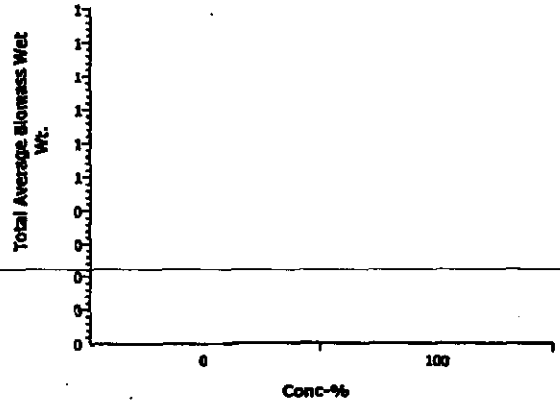
ANOVA Assumptions

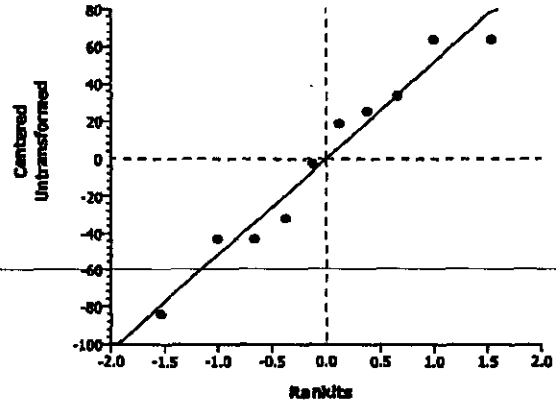
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.61984	23.15450	0.65173	Equal Variances
Distribution	Shapiro-Wilk W	0.94404		0.59876	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	144.97	101.89	208.61	45.832				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 BM Day 12 NJ Day 14 BM Day 18 NJ Day 21 (A) Day 28 BM

Sample ID: E287701-SO12 B1547-07

CONC.	REPLICATE	# seeds germinated: PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	21	7-DAYS POST-EMERGENCE (21 days after planting)	25	30	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (28 days after planting)
100%	A	5	5	5	5	5		5	4	6.9	6.8
	B	3	5	6	6	6		6→5	5		
	C	1	1	1	1	1		2	2		
	D	4	4	6	7	7		6→5	5		
	E	4	5	5	5	5		3	3		

7-Days Post-Emergence: Selectively thin down to 5 Seedings (leave the 5 tallest seedings). Describe shoot appearance:

Replicate A: 3 medium in good shape + 1 small w/ 3 green + 1 brown + 1 small 2 shoots green

Replicate B: 5 medium in good shape + 1 small in good shape - small plant removed

Replicate C: 1 medium + 1 small in good shape

Replicate D: 4 medium + 2 small in good shape + 1 small dead - 1 small good shape removed

Replicate E: 3 medium in good shape + 3 small dead plants

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 medium & 1 small plant, all in good shape

Replicate B: 4 medium & 1 small plant, all in good shape

Replicate C: 2 small plants 1 browning @ tips

Replicate D: 3 medium, 1 small plant all look good

Replicate E: 3 medium plants all look good

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# of Shoots
Replicate A	44 mm	55 mm	45 mm	29 mm	— mm	11, 14, 19, 5
Replicate B	40 mm	41 mm	45 mm	40 mm	22 mm	8, 11, 17, 19, 5
Replicate C	40 mm	17 mm	— mm	— mm	— mm	4, ~~17~~ 9 ms
Replicate D	58 mm	39 mm	22 mm	56 mm	45 mm	15, 14, 14, 16, 15
Replicate E	60 mm	57 mm	45 mm	mm	mm	10, 11, 11

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1007.68	1502.0	1084.10
Replicate B	984.36	1298.9	1044.08
Replicate C	1004.73	1069.5	1025.72
Replicate D	1022.04	1428.1	1104.91
Replicate E	995.72	1247.3	1042.75

Describe root appearance:

Replicate A:

Replicate B:

Replicate C:

Replicate D: "bushy" many branches

Replicate E:

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	110 mm	95 mm	87 mm	45 mm	mm
Replicate B	75 mm	86 mm	70 mm	101 mm	45 mm
Replicate C	91 mm	37 mm	mm	mm	mm
Replicate D	89 mm	97 mm	95 mm	65 mm	45 mm
Replicate E	103 mm	95 mm	110 mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1013.67	1419.2	1069.22
Replicate B	968.36	1456.7	1001.77
Replicate C	1011.03	1087.0	1023.96
Replicate D	1006.99	1716.4	1061.36
Replicate E	999.37	1346.2	1022.16

Comments: 90 g dry wt. / mg. 2-14-06 removed other sporting plants (brown leaves)

CETIS Test Summary

Report Date: 10 Mar-06 3:32 PM
Test Link: 03-2429-7417/B154207psc

Plant Chronic test — **CH2M Hill**

Test No:	10-7437-4221	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			
Comments:	E2877.01				

Sample No:	05-1608-3151	**Code:**	B1542-07	**Client:**	
Sample Date:	21 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	65d 0h	**Station:**			
Comments:	J10DV0, E287701				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
11-0323-4244	% Germination	100	> 100	N/A	29.15%	Equal Variance t Two-Sample
06-9182-2401	AG Average Dry Wt.	100	> 100	N/A	40.28%	Equal Variance t Two-Sample
07-3152-3077	AG Average Height	100	> 100	N/A	34.46%	Equal Variance t Two-Sample
19-6612-9266	AG Average Wet Wt.	100	> 100	N/A	48.02%	Equal Variance t Two-Sample
10-8022-6215	Root Average Dry Wt.	100	> 100	N/A	55.59%	Equal Variance t Two-Sample
07-8510-5912	Root Average Length	100	> 100	N/A	28.91%	Equal Variance t Two-Sample
10-5296-9200	Root Average Wet Wt.	100	> 100	N/A	61.63%	Equal Variance t Two-Sample
00-2777-8528	Total Average Biomass Dry	100	> 100	N/A	45.41%	Equal Variance t Two-Sample
09-4056-4643	Total Average Biomass Wet	100	> 100	N/A	55.04%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 3:32 PM
Test Link: 03-2429-7417/B154207psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.76000	0.40000	1.00000	0.11662	0.26077	34.31%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	14.659	10.595	19.105	1.6121	3.6047	24.59%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	11.73	7.6	18	1.8561	4.1548	35.42%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	76.856	32.385	123.58	14.88	33.272	43.29%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	9.1010	6.465	13.887	1.4338	3.2061	35.23%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	28.46	22.5	33	1.7486	3.91	13.74%
100		5	23.587	15	34.333	4.065	9.0896	38.54%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	123.91	37.985	226.38	30.793	68.855	55.57%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	23.76	17.060	32.992	2.9736	6.6492	27.98%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	200.76	70.37	349.96	45.485	101.71	50.66%

CETIS Test Summary

Report Date: 10 Mar-06 3:32 PM
Test Link: 03-2429-7417/B154207psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.80000	1.00000	0.40000	1.00000	0.60000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		19.105	11.344	10.5950	16.5740	15.6767

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		10.75	7.8	13.5	8.8	18

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		123.580	62.9080	32.3850	81.212	84.1934

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		13.8875	6.68201	6.465	10.874	7.59686

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	27.8	28.4	30.6	33	22.5
100		21	15	32	15.6	34.3333

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		226.382	97.668	37.985	141.882	115.61

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		32.9925	18.0260	17.0601	27.448	23.2733

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		349.963	160.576	70.37	223.094	199.803

CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Germination	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	29.15%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.83103	1.85955	0.2150	0.29562	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0436344	0.043634	1	0.69	0.43006	Non-Significant Effect
Error	0.5054631	0.063183	8			
Total	0.54909750	0.1068173	9			

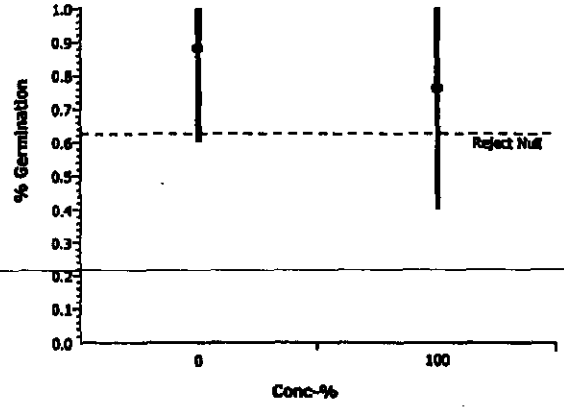
ANOVA Assumptions

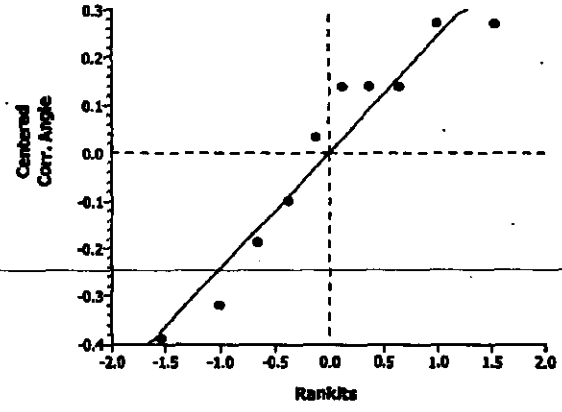
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.96770	23.15450	0.52822	Equal Variances
Distribution	Shapiro-Wilk W	0.90703		0.26121	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.76000	0.40000	1.00000	0.26077	1.07370	0.68472	1.34528	0.28946

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Dry Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	40.28%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.8628	1.85955	0.7933	4.97430	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	13.31844	13.31844	1	0.74	0.41334	Non-Significant Effect
Error	143.1132	17.88915	8			
Total	156.431646	31.207592	9			

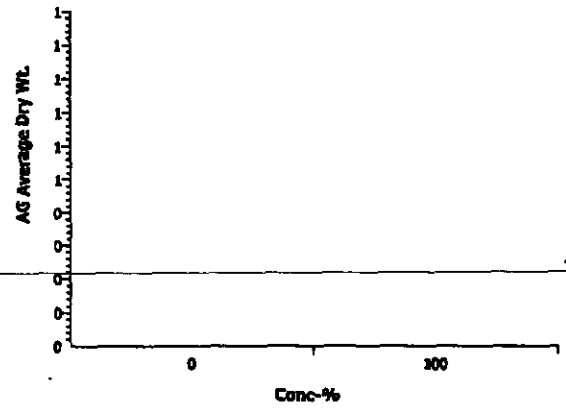
ANOVA Assumptions

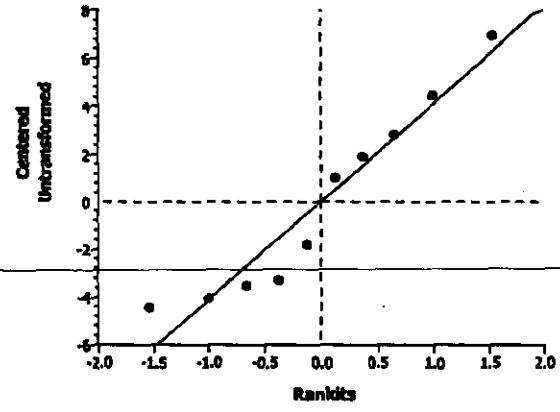
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.75351	23.15450	0.59977	Equal Variances
Distribution	Shapiro-Wilk W	0.91217		0.29621	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	14.659	10.595	19.105	3.6047				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Height	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.5602	1.85955	0.7047	3.66215	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.043361	3.043361	1	0.31	0.59065	Non-Significant Effect
Error	77.56889	9.696111	8			
Total	80.612247	12.739472	9			

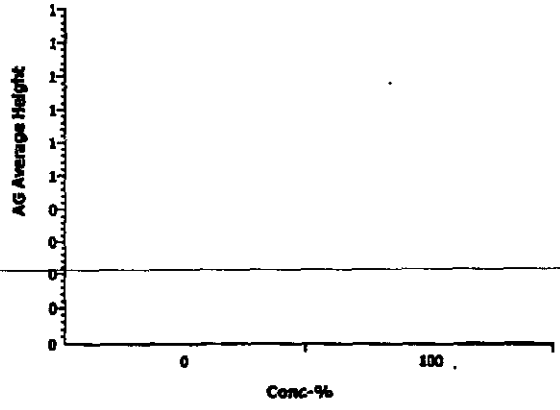
ANOVA Assumptions

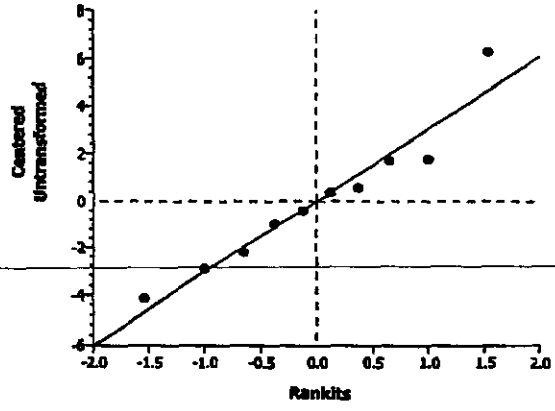
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.10338	23.15450	0.06710	Equal Variances
Distribution	Shapiro-Wilk W	0.94876		0.65384	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		5	11.730	7.6	18	4.1548				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	48.02%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.785	1.85955	0.7725	30.6833	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	419.4125	419.4125	1	0.62	0.45508	Non-Significant Effect
Error	5445.28	680.66	8			
Total	5864.69229	1100.0725	9			

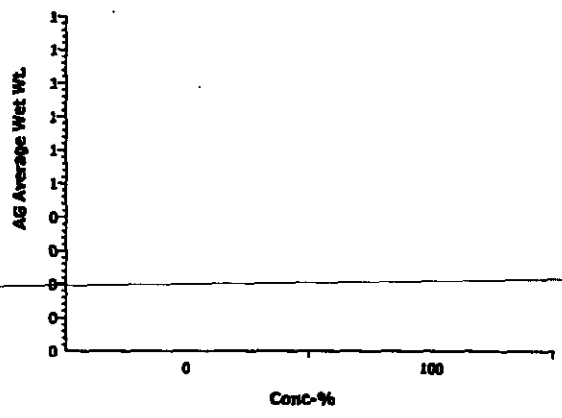
ANOVA Assumptions

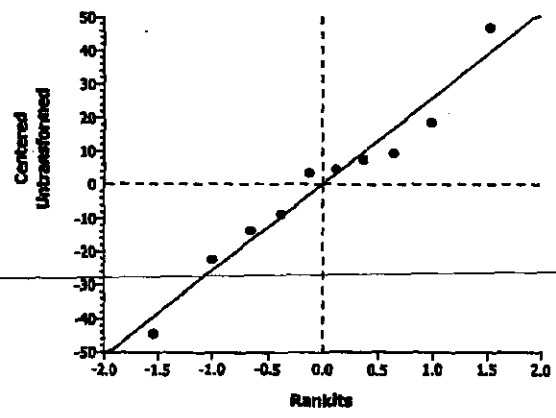
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.35362	23.15450	0.18327	Equal Variances
Distribution	Shapiro-Wilk W	0.97222		0.91060	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	76.856	32.385	123.58	33.272				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.59%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.5249	1.85955	0.6931	4.37287	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.809574	3.809574	1	0.28	0.61386	Non-Significant Effect
Error	110.5981	13.82476	8			
Total	114.407681	17.634337	9			

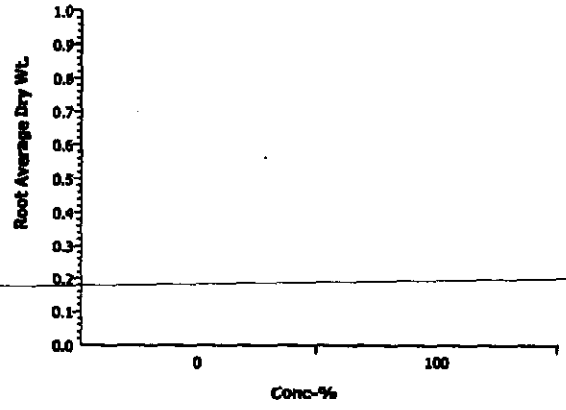
ANOVA Assumptions

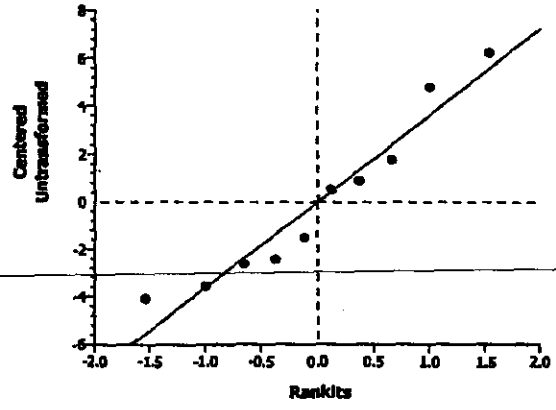
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.68983	23.15450	0.62375	Equal Variances
Distribution	Shapiro-Wilk W	0.92375		0.38925	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	9.1010	6.465	13.888	3.2061				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	28.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.10129	1.85955	0.1514	8.22874	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	59.37344	59.37344	1	1.21	0.30280	Non-Significant Effect
Error	391.6356	48.95444	8			
Total	451.009003	108.32789	9			

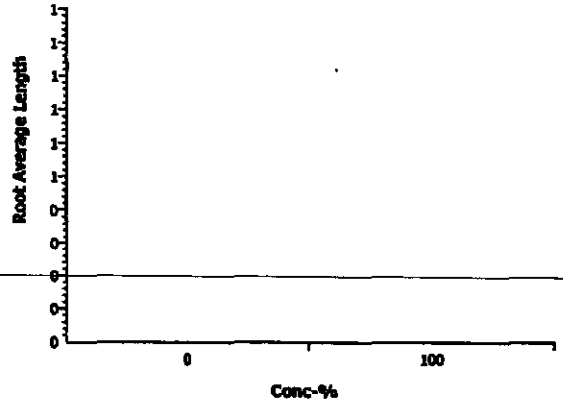
ANOVA Assumptions

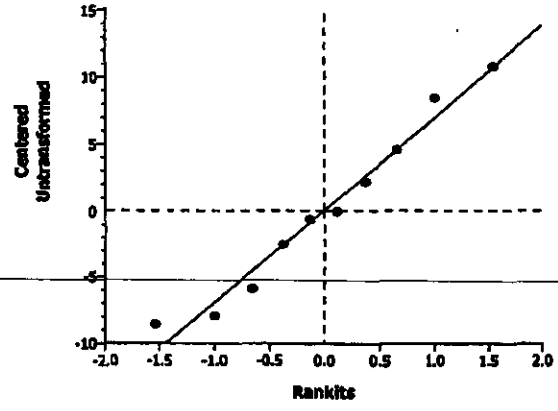
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.40430	23.15450	0.13106	Equal Variances
Distribution	Shapiro-Wilk W	0.95526		0.73079	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	28.46	22.5	33	3.91				
100		5	23.587	15	34.333	9.0896				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Wet Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	61.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.2844	1.85955	0.6083	69.7836	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	284.6931	284.6931	1	0.08	0.78335	Non-Significant Effect
Error	28165.79	3520.723	8			
Total	28450.4782	3805.4162	9			

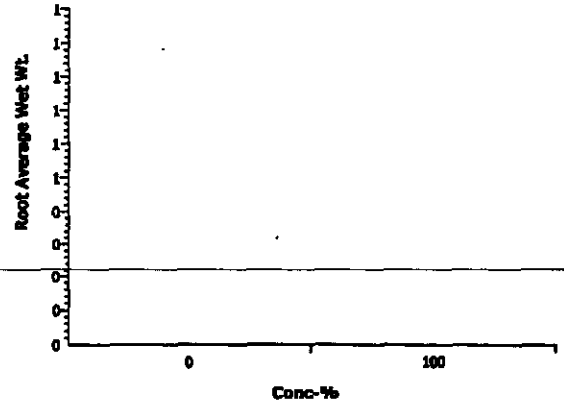
ANOVA Assumptions

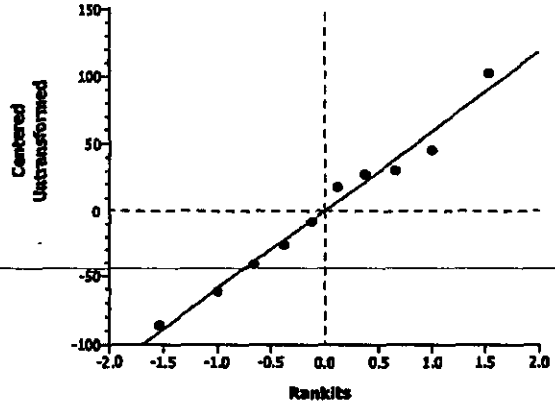
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.06099	23.15450	0.50090	Equal Variances
Distribution	Shapiro-Wilk W	0.98045		0.96755	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	123.91	37.985	226.38	68.855				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Dry Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	45.41%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.7176	1.85955	0.7533	9.18014	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	31.37398	31.37398	1	0.51	0.49343	Non-Significant Effect
Error	487.4312	60.9289	8			
Total	518.805197	92.302885	9			

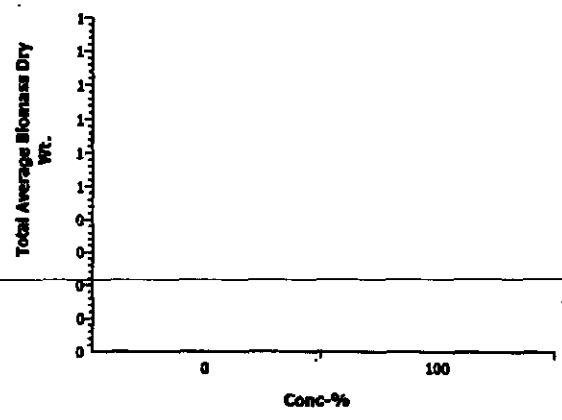
ANOVA Assumptions

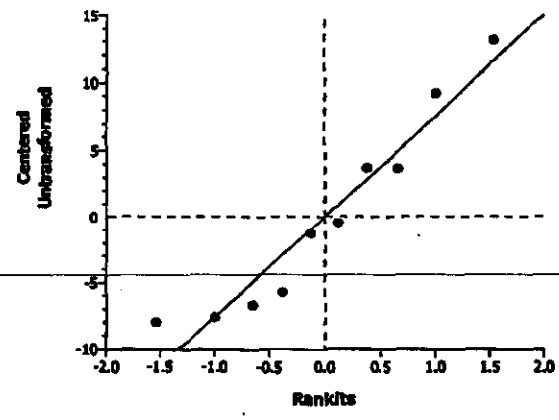
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.75627	23.15450	0.59876	Equal Variances
Distribution	Shapiro-Wilk W	0.91351		0.30596	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	23.76	17.060	32.992	6.6491				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	03-2429-7417	03-2429-7417	10 Mar-06 3:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C>T	Untransformed		100	>100	1	N/A	55.04%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.4505	1.85955	0.6679	97.5044	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1395.204	1395.204	1	0.20	0.66428	Non-Significant Effect
Error	54987.49	6873.436	8			
Total	56382.6920	8268.6398	9			

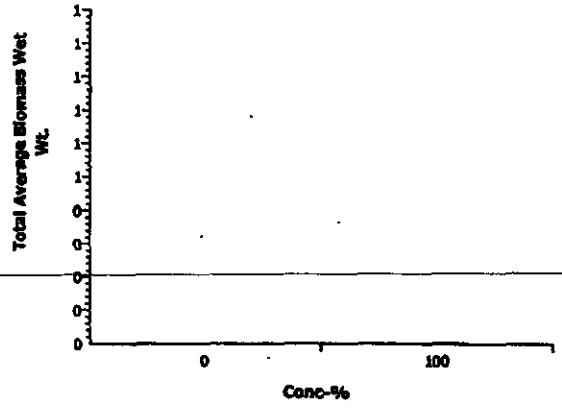
ANOVA Assumptions

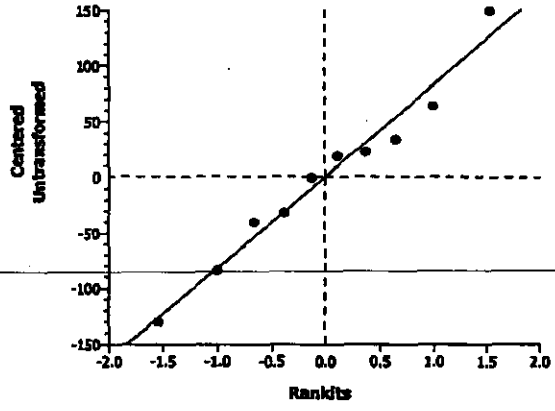
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.04021	23.15450	0.30692	Equal Variances
Distribution	Shapiro-Wilk W	0.98099		0.97023	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	200.76	70.37	349.96	101.71				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2008

Initials: Day 0 BM Day 12 NT Day 14 BM Day 16 NT Day 21 (BM) Day 28 BM

Sample ID: E289701-SQ12 B1542-08										
		# seeds germinated # alive							pH	
CONC.	REPLICATE	PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting) 21		7-DAYS POST-EMERGENCE (21 days after planting) 23	30	14-DAYS POST-EMERGENCE (28 days after planting)	INITIAL (@ planting)	FINAL (28 days after planting)
100%	A	2	3	4	4	4	5		7.3	6.8
	B	2	3	5	5	5	5			
	C	3	5	7	4	7	7→5			
	D	1	1	2	4	4	3			
	E	4	4	4	6	7	7→5			

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 medium in good shape + 2 small w/ browning edges.

Replicate B: 2 medium in good shape + 3 small brown plants - 1 broadleaf plant removed

Replicate C: 3 large + 2 medium in good shape - 2 small plants and 1 broadleaf plant removed

Replicate D: 1 medium in good shape, 1 small in good shape, 1 small turning brown, 3 broad leaf + 1 very long single stem plant removed

Replicate E: 2 large + 3 medium in good shape, 2 small removed + 1 broadleaf plant removed

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 medium in good shape - all green + 1 small but green & 1 small brown

Replicate B: 1 small in good shape + 1 small w/ 2 browning shoots + 2 small brown

Replicate C: 3 large + 2 medium - all green and in good shape

Replicate D: 1 medium in good shape, 2 small; one with 2 brown tips on shoots, 1 small brown shoot

Replicate E: 1 large + ~~3~~ 3 medium - all green + in good shape

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# of shoots
Replicate A	557 mm	mm	mm	mm	mm	46
Replicate B	240 mm	mm	mm	mm	mm	26
Replicate C	800 mm	mm	mm	mm	mm	68
Replicate D	570 mm	mm	mm	mm	mm	22
Replicate E	980 mm	mm	mm	mm	mm	84

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	986.95	1277.6	1058.96
Replicate B	978.08	1060.6	992.01
Replicate C	1013.99	1578.3	1095.87
Replicate D	976.55	1071.9	995.07
Replicate E	1012.66	1874.0	1108.04

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	175 mm	mm	mm	mm	mm
Replicate B	150 mm	mm	mm	mm	mm
Replicate C	178 mm	mm	mm	mm	mm
Replicate D	122 mm	mm	mm	mm	mm
Replicate E	270 mm	mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	967.35	1731.0	989.02
Replicate B	1024.31	1102.5	1031.92
Replicate C	964.73	1911.4	1003.88
Replicate D	1003.90	~~1115.2~~	1019.33
Replicate E	997.67	2173.7	1037.86

Comments: 90% dry out replicate, broadleaf plants removed 2-14-08

CETIS Test Summary

Report Date: 10 Mar-06 3:38 PM
Test Link: 08-6576-0477/B154208psc

Plant Chronic test — **CH2M Hill**

Test No:	20-1165-4941	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			

Sample No:	15-5450-5055	**Code:**	B1542-08	**Client:**	
Sample Date:	28 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	58d 0h	**Station:**			

Comments: J10LJ5, E289701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
15-9577-8021	% Germination	100	> 100	N/A	23.35%	Wilcoxon Rank Sum Two-Sample
13-0879-1029	AG Average Dry Wt.	100	> 100	N/A	55.97%	Equal Variance t Two-Sample
15-2658-0580	AG Average Wet Wt.	100	> 100	N/A	85.91%	Equal Variance t Two-Sample
06-9453-6105	Root Average Dry Wt.	100	> 100	N/A	52.48%	Equal Variance t Two-Sample
05-1384-9566	Root Average Wet Wt.	100	> 100	N/A	72.60%	Equal Variance t Two-Sample
05-3828-6637	Total Average Biomass Dry	100	> 100	N/A	52.88%	Equal Variance t Two-Sample
03-2729-5818	Total Average Biomass Wet	100	> 100	N/A	74.97%	Equal Variance t Two-Sample

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.92000	0.80000	1.00000	0.08000	0.17889	19.44%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	10.963	2.786	19.076	3.0434	6.8052	62.08%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	78.309	16.504	172.27	28.648	64.058	81.80%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	5.3735	1.522	8.0380	1.2063	2.6973	50.20%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	127.49	15.638	236.01	38.654	86.433	67.79%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	16.336	4.3080	27.114	4.1865	9.3612	57.30%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	205.80	32.142	408.27	66.483	148.66	72.23%

CETIS Test Summary

Report Date: 10 Mar-06 3:38 PM
Test Link: 08-6576-0477/B154208psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		1.00000	1.00000	1.00000	0.60000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		10.402	2.786	16.3760	6.17334	19.0760

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		58.13	16.504	112.862	31.7833	172.268

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		4.33401	1.522	7.83000	5.14333	8.03800

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		92.7300	15.638	189.334	103.767	236.006

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		14.7360	4.30801	24.2060	11.3167	27.1140

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		150.86	32.142	302.196	135.550	408.274

CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:37 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	23.35%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Dilution Water		100	29.5		0.5794	3	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0056708	0.005671	1	0.13	0.72399	Non-Significant Effect
Error	0.3390172	0.042377	8			
Total	0.34468800	0.0480479	9			

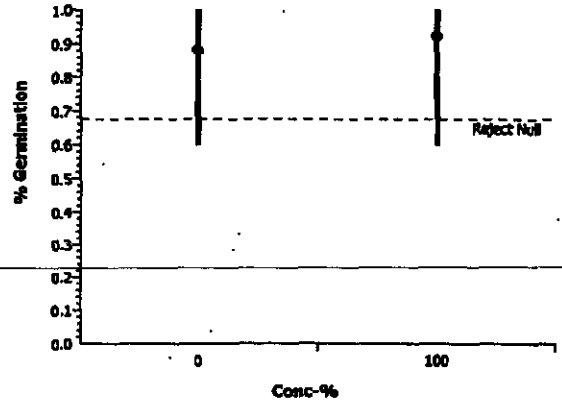
ANOVA Assumptions

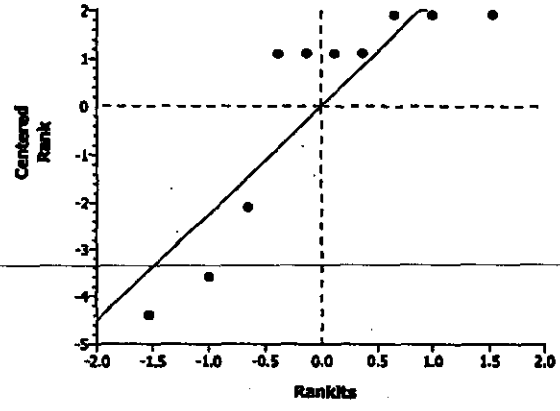
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00963	23.15450	0.99281	Equal Variances
Distribution	Shapiro-Wilk W	0.71659		0.00140	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	5.10000	1.50000	7.00000	2.65518
100		5	0.92000	0.60000	1.00000	0.17889	5.90000	1.50000	7.00000	2.45967

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.37342	1.85955	0.3593	6.91265	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.817486	4.817486	1	0.14	0.71853	Non-Significant Effect
Error	276.3788	34.54735	8			
Total	281.19627	39.364834	9			

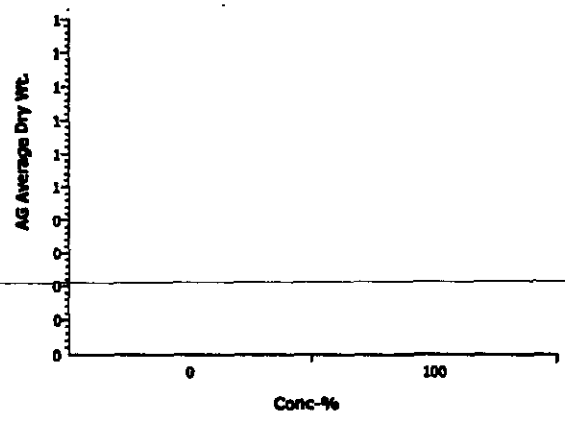
ANOVA Assumptions

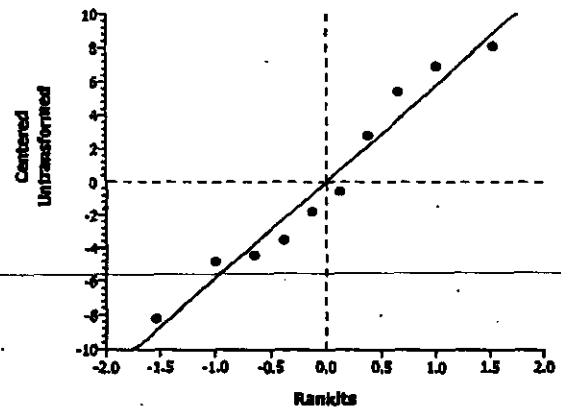
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.03252	23.15450	0.50901	Equal Variances
Distribution	Shapiro-Wilk W	0.94217		0.57742	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	10.963	2.786	19.076	6.8052				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Wet Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	85.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.488	1.85955	0.6807	54.8976	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	518.847	518.847	1	0.24	0.63866	Non-Significant Effect
Error	17431.01	2178.877	8			
Total	17949.8607	2697.7238	9			

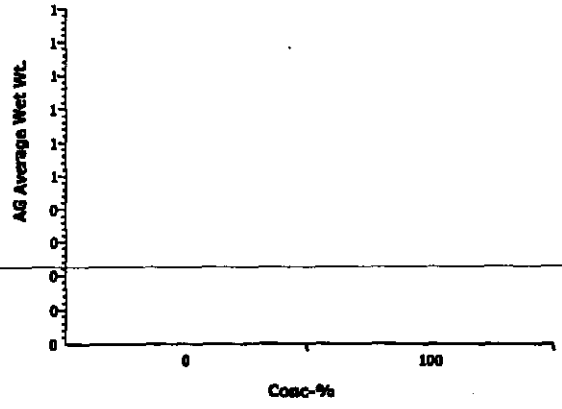
ANOVA Assumptions

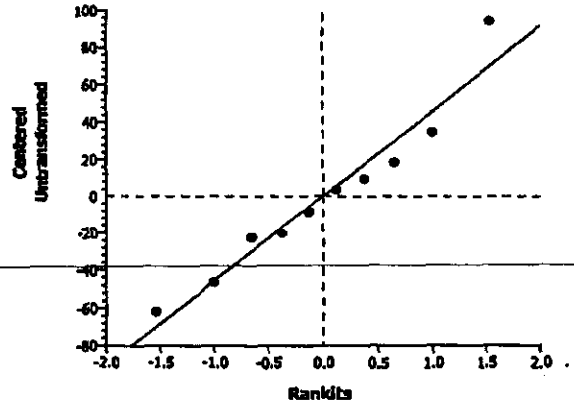
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	16.13761	23.15450	0.01963	Equal Variances
Distribution	Shapiro-Wilk W	0.95324		0.70689	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	78.309	16.504	172.27	64.058				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	52.48%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.12295	1.85955	0.1470	4.1285	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.53922	15.53922	1	1.26	0.29403	Non-Significant Effect
Error	98.58252	12.32281	8			
Total	114.121741	27.862037	9			

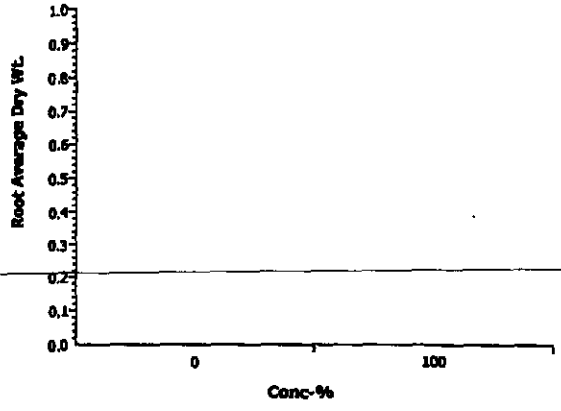
ANOVA Assumptions

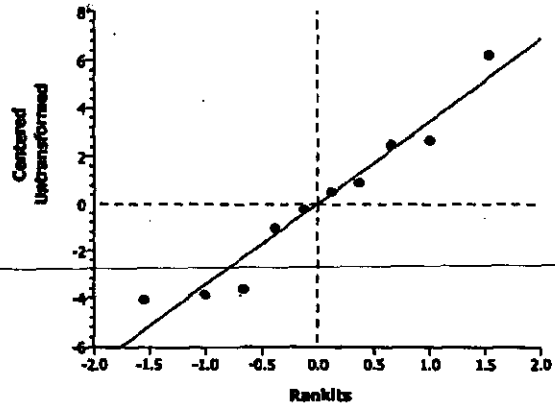
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38753	23.15450	0.41996	Equal Variances
Distribution	Shapiro-Wilk W	0.94036		0.55702	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	5.3735	1.522	8.038	2.6973				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	72.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.3226	1.85955	0.6224	82.2037	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	508.4237	508.4237	1	0.10	0.75527	Non-Significant Effect
Error	39083.88	4885.484	8			
Total	39592.2987	5393.9081	9			

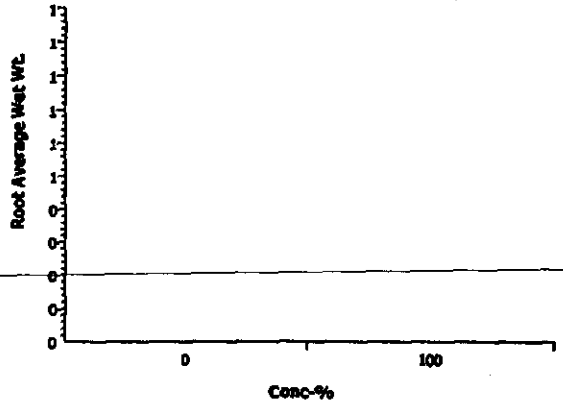
ANOVA Assumptions

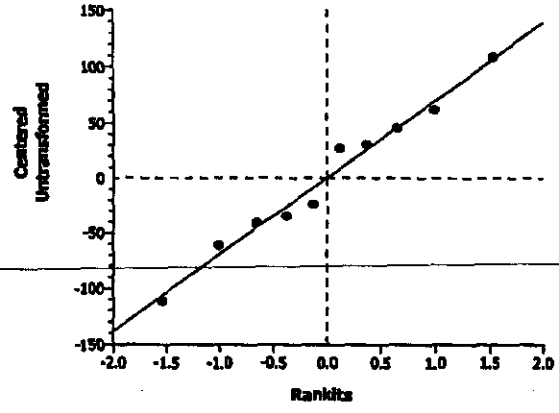
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.24754	23.15450	0.28037	Equal Variances
Distribution	Shapiro-Wilk W	0.97884		0.95867	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	127.49	15.638	236.01	86.433				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	52.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.67508	1.85955	0.2593	10.6913	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	37.66095	37.66095	1	0.46	0.51866	Non-Significant Effect
Error	661.1147	82.63934	8			
Total	698.7757	120.3003	9			

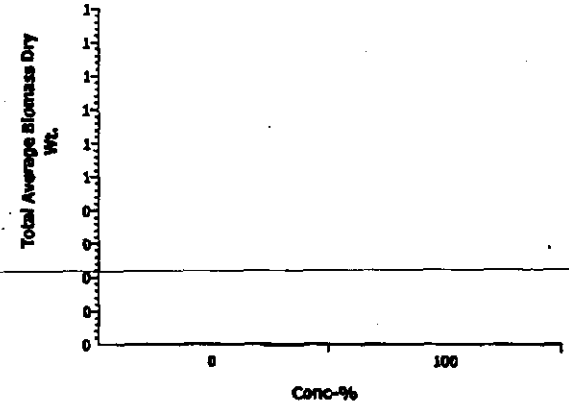
ANOVA Assumptions

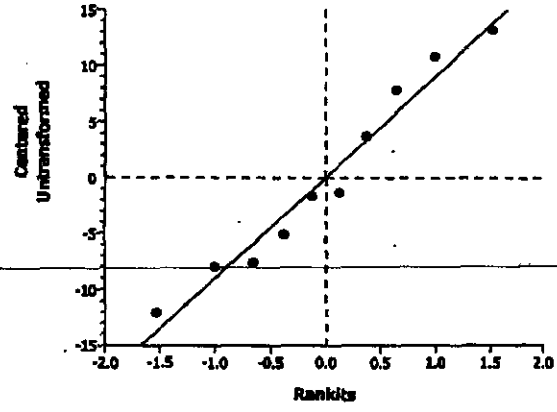
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12860	23.15450	0.90949	Equal Variances
Distribution	Shapiro-Wilk W	0.94792		0.64396	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	16.336	4.3080	27.114	9.3612				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	08-6576-0477	08-6576-0477	10 Mar-06 3:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	74.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-0.4014	1.85955	0.6507	132.804	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2054.488	2054.488	1	0.16	0.69863	Non-Significant Effect
Error	102008.6	12751.07	8			
Total	104063.043	14805.558	9			

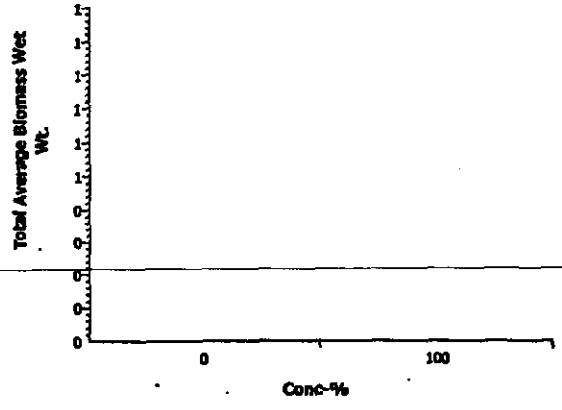
ANOVA Assumptions

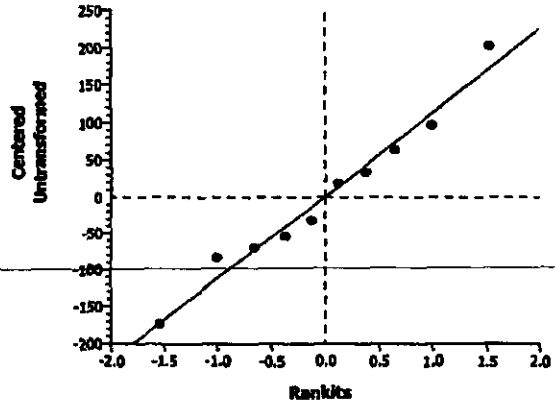
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.49508	23.15450	0.09731	Equal Variances
Distribution	Shapiro-Wilk W	0.98356		0.98135	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	205.80	32.142	408.27	148.66				

Graphics





BLUEGRASS GROWTH TEST

Client: Hanford Project

Test Start Date: 01/25/2006

Initials: Day 0 BW Day 12 NJ Day 14 BW Day 16 NT Day 21 [illegible] Day 28 BW

Sample ID: E285301-SO12 B6542-09

CONC.	REPLICATE	PRE-EMERGENCE (12 days after planting)	@ EMERGENCE (14 days after planting)	POST-EMERGENCE (16 days after planting)	# seeds germinated 7-DAYS POST-EMERGENCE (21 days after planting)			14-DAYS POST-EMERGENCE (28 days after planting)	pH INITIAL (@ planting)	pH FINAL (28 days after planting)
100%	A	1	1	1	1	1	2	2	7.4	7.2
	B	1	1	3	3	3	3	3		
	C	0	BW/2	2	2	3	3	3		
	D	0	1	1	2	2	3	2		
	E	0	2	3	5	3	2	2		

(Day 21)

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 1 medium + 1 small (only 2 shoots) w/ good color - 1 broadleaf plant removed

Replicate B: 1 large + 2 small - all w/ good color

Replicate C: 2 medium + 1 small - good color

Replicate D: 2 medium plants w/ good color + 1 seedling just emerging

Replicate E: 1 medium + 1 small in good shape + 1 small brown single shoot.

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 small plants / looks poor only 3 shoots / brown

Replicate B: 2 small / large - small look poor / large looks good

Replicate C: 2 medium / small look good

Replicate D: 2 medium / look good

Replicate E: 2 plants / small / medium

Measure Shoot Height: (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling	# Shoots of Blades
Replicate A	40 mm	27 mm	— mm	— mm	— mm	2, 10
Replicate B	20 mm	21 mm	68 mm	— mm	— mm	3, 2, 19
Replicate C	46 mm	50 mm	15 mm	— mm	— mm	12, 17, 3
Replicate D	55 mm	45 mm	mm	mm	mm	8, 14
Replicate E	36 mm	29 mm	mm	mm	mm	10, 4, 5 ms

Measure Shoot Weight: (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	974.32	1014.3	981.89
Replicate B	982.82	1204.1	1019.02
Replicate C	989.34	1196.2	1022.48
Replicate D	986.00	1122.6	1009.69
Replicate E	983.66	1031.8	992.79

Describe root appearance:

Replicate A:

Replicate B: 1 large root system - paler in color than normal, 2 small etc.

Replicate C:

Replicate D:

Replicate E:

Measure Root Length: (longest root)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	55 mm	22 mm	mm	mm	mm
Replicate B	209 mm	35 mm	32 mm	mm	mm
Replicate C	100 mm	27 mm	110 mm	mm	mm
Replicate D	92 mm	[illegible] mm	104 mm	mm	mm
Replicate E	80 mm	60 mm	mm	mm	mm

Measure Root Weight: (longest root)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1018.20	1130.0	1025.72
Replicate B	1016.76	1310.8	1030.89
Replicate C	1028.37	1338.6	1044.24
Replicate D	1008.21	1298.4	1024.74
Replicate E	1017.37	1119.6	1023.91

Comments: 85 g dry wt. / rep, broad leaved seedlings removed 2-14-06

CETIS Test Summary

Report Date: 10 Mar-06 3:44 PM
Test Link: 01-8369-8444/B154209psc

Plant Chronic test — **CH2M Hill**

Test No:	15-8481-0577	**Test Type:**	Plant Chronic test	**Duration:**	37d 0h
Start Date:	25 Jan-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	03 Mar-06	**Dil Water:**		**Source:**	
Setup Date:	25 Jan-06 12:00 AM	**Brine:**			

Sample No:	07-3184-0122	**Code:**	B1542-09	**Client:**	
Sample Date:	06 Dec-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	50d 0h	**Station:**			

Comments: J10DT9, E295301

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-8687-3352	% Germination	< 100	100	N/A	18.38%	Equal Variance t Two-Sample
04-6596-1272	AG Average Dry Wt.	100	> 100	N/A	42.47%	Equal Variance t Two-Sample
07-9120-2062	AG Average Height	100	> 100	N/A	42.66%	Equal Variance t Two-Sample
16-4154-3147	AG Average Wet Wt.	100	> 100	N/A	40.33%	Equal Variance t Two-Sample
09-6233-5934	Root Average Dry Wt.	100	> 100	N/A	48.68%	Equal Variance t Two-Sample
08-1097-6197	Root Average Length	100	> 100	N/A	29.97%	Equal Variance t Two-Sample
12-8307-1390	Root Average Wet Wt.	100	> 100	N/A	45.20%	Equal Variance t Two-Sample
08-5176-9503	Total Average Biomass Dry	100	> 100	N/A	43.16%	Equal Variance t Two-Sample
17-0304-2643	Total Average Biomass Wet	100	> 100	N/A	40.21%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 10 Mar-06 3:44 PM
Test Link: 01-8369-8444/B154209psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
100		5	0.48000	0.40000	0.60000	0.04899	0.10954	22.82%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	12.351	7.9275	19.276	2.1347	4.7733	38.65%
100		5	8.6617	3.7850	12.067	1.8436	4.1225	47.59%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	10.627	8.4	12.333	0.6527	1.4595	13.73%
100		5	16.467	12	25	2.349	5.2525	31.90%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	63.903	41.475	82.338	7.1313	15.946	24.95%
100		5	51.001	19.99	73.76	11.883	26.571	52.10%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	7.8666	3.78	14.108	1.8639	4.1678	52.98%
100		5	5.059	3.27	8.265	0.8758	1.9584	38.71%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	28.46	22.5	33	1.7486	3.91	13.74%
100		5	36.867	26.333	49	4.2408	9.4827	25.72%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	113.23	51.638	158.52	21.449	47.962	42.36%
100		5	90.707	51.115	145.1	17.251	38.574	42.53%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	20.217	12.223	33.384	3.9407	8.8117	43.58%
100		5	13.721	7.5450	20.11	2.5474	5.6962	41.52%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	5	177.14	93.113	240.86	26.086	58.331	32.93%
100		5	141.71	75.185	213.39	28.05	62.721	44.26%

CETIS Test Summary

Report Date: 10 Mar-06 3:44 PM
Test Link: 01-8369-8444/B154209psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.00000	1.00000	1.00000	0.60000	0.80000
100		0.40000	0.60000	0.60000	0.40000	0.40000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	15.1720	10.552	19.276	8.82666	7.92751
100		3.78500	12.0667	11.0467	11.8450	4.56500

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	10.2	8.4	11.2	12.3333	11
100		17	12	12.3333	25	16

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	67.2900	55.1900	82.338	73.2233	41.4750
100		19.99	73.76	68.8667	68.3	24.0700

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	8.75601	8.39399	14.108	3.77999	4.295
100		3.75998	4.71000	5.29	8.26498	3.26999

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	27.8	28.4	30.6	33	22.5
100		44	30	28.3333	49	35

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	143.362	140.624	158.524	72.0233	51.6375
100		55.9	98.0133	103.41	145.095	51.115

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	23.9280	18.946	33.384	12.6066	12.2225
100		7.54501	16.7767	16.3366	20.11	7.83502

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	210.652	195.814	240.862	145.247	93.1125
100		75.89	171.773	172.297	213.395	75.185

CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	18.38%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	4.21032	1.85955	0.0015	0.19458	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4852164	0.485216	1	17.73	0.00295	Significant Effect
Error	0.2189753	0.027372	8			
Total	0.70419164	0.5125883	9			

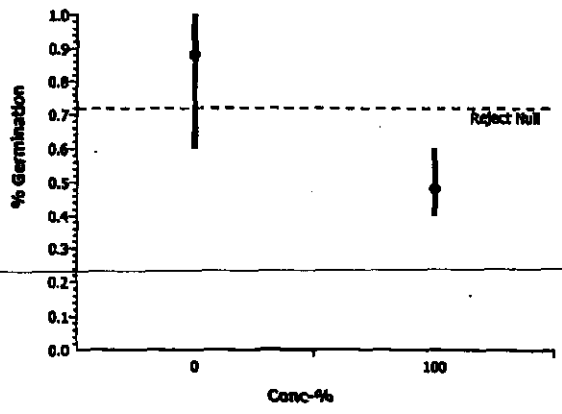
ANOVA Assumptions

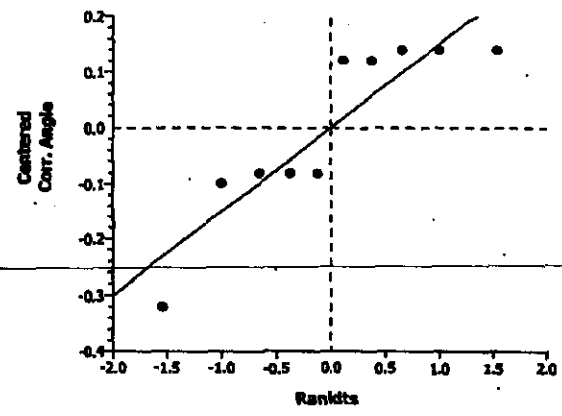
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.50066	23.15450	0.25233	Equal Variances
Distribution	Shapiro-Wilk W	0.81229		0.02044	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
100		5	0.48000	0.40000	0.60000	0.10954	0.76526	0.68472	0.88608	0.11029

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	42.47%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.30792	1.85955	0.1136	5.24509	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	34.02485	34.02485	1	1.71	0.22723	Non-Significant Effect
Error	159.1186	19.88983	8			
Total	193.143456	53.914675	9			

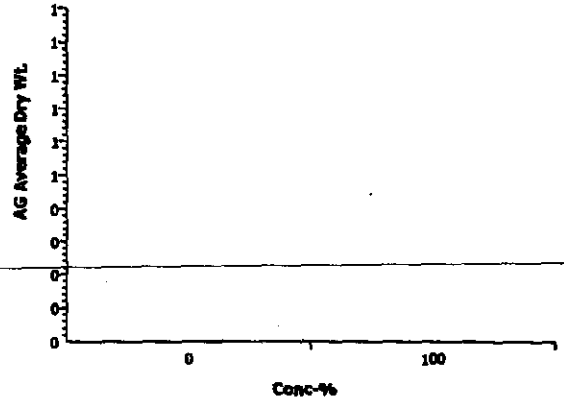
ANOVA Assumptions

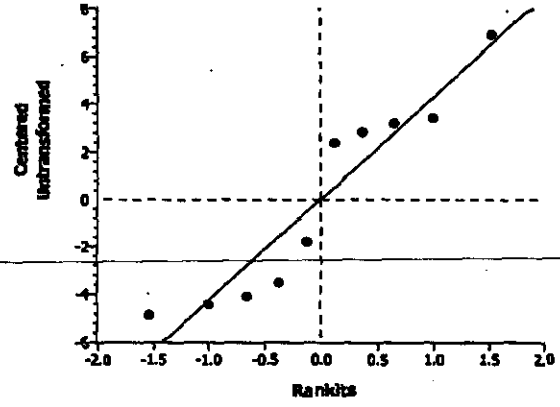
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.34066	23.15450	0.78323	Equal Variances
Distribution	Shapiro-Wilk W	0.88302		0.14132	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	12.351	7.9275	19.276	4.7733				
100		5	8.6617	3.7850	12.067	4.1225				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	42.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-2.3954	1.85955	0.9783	4.53357	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	85.264	85.264	1	5.74	0.04349	Significant Effect
Error	118.8764	14.85956	8			
Total	204.140442	100.12356	9			

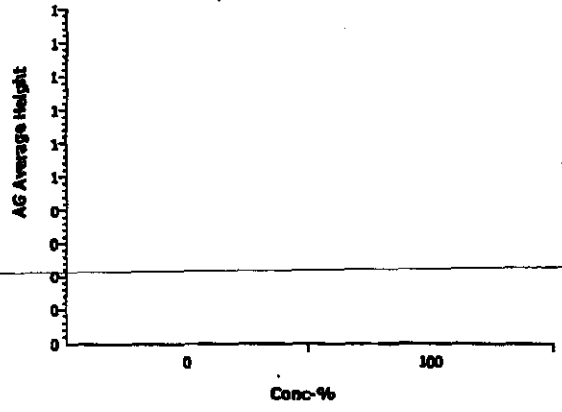
ANOVA Assumptions

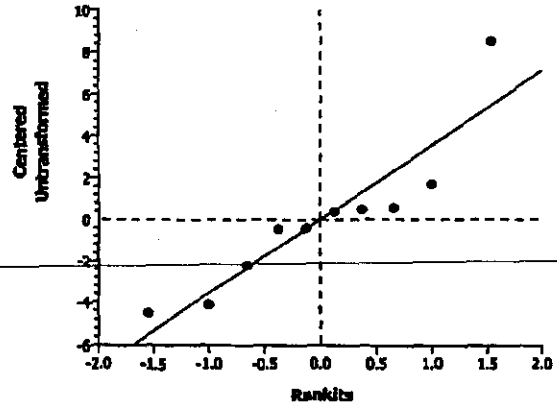
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	12.95118	23.15450	0.02935	Equal Variances
Distribution	Shapiro-Wilk W	0.86399		0.08503	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	10.627	8.4	12.333	1.4595				
100		5	16.467	12	25	5.2525				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Wet Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	40.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.93097	1.85955	0.1896	25.7707	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	416.1495	416.1495	1	0.87	0.37911	Non-Significant Effect
Error	3841.203	480.1504	8			
Total	4257.35239	896.29987	9			

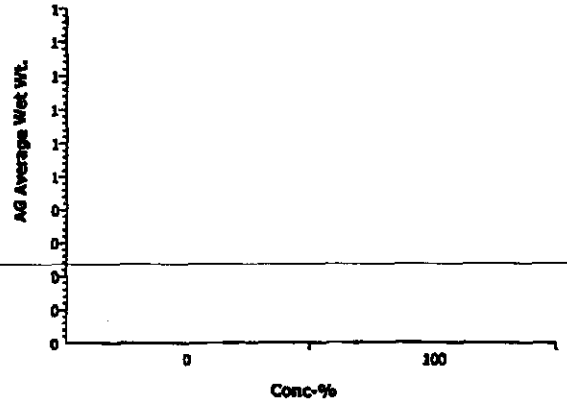
ANOVA Assumptions

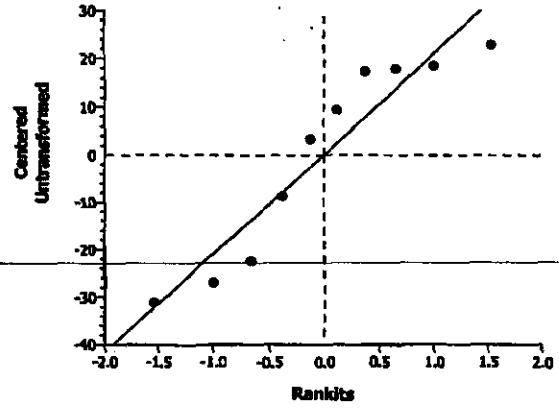
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.77655	23.15450	0.34643	Equal Variances
Distribution	Shapiro-Wilk W	0.87112		0.10300	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	63.903	41.475	82.338	15.946				
100		5	51.001	19.99	73.76	26.571				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Dry Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	48.68%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.36331	1.85955	0.1050	3.82955	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	19.70663	19.70663	1	1.86	0.20991	Non-Significant Effect
Error	84.82246	10.60281	8			
Total	104.529087	30.309438	9			

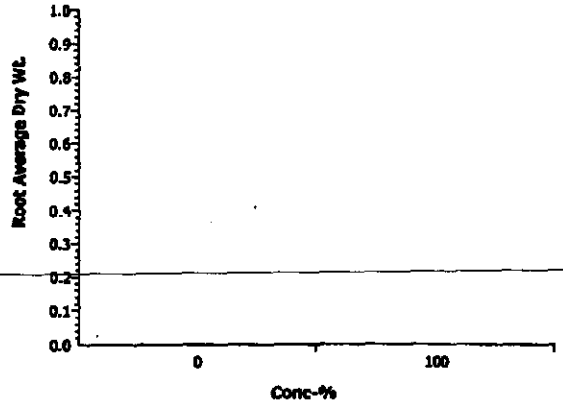
ANOVA Assumptions

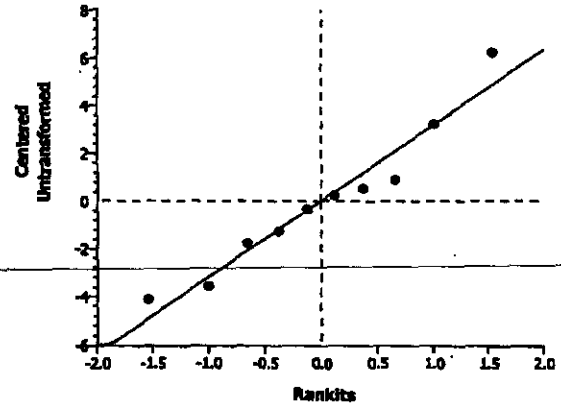
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.52895	23.15450	0.17261	Equal Variances
Distribution	Shapiro-Wilk W	0.94997		0.66819	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	7.8666	3.78	14.108	4.1678				
100		5	5.059	3.27	8.265	1.9584				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	29.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	-1.8327	1.85955	0.9479	8.53005	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	176.6801	176.6801	1	3.36	0.10421	Non-Significant Effect
Error	420.8409	52.60511	8			
Total	597.520996	229.28522	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.88188	23.15450	0.11442	Equal Variances
Distribution	Shapiro-Wilk W	0.98660		0.99071	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	28.46	22.5	33	3.91				
100		5	36.667	26.333	49	9.4827				

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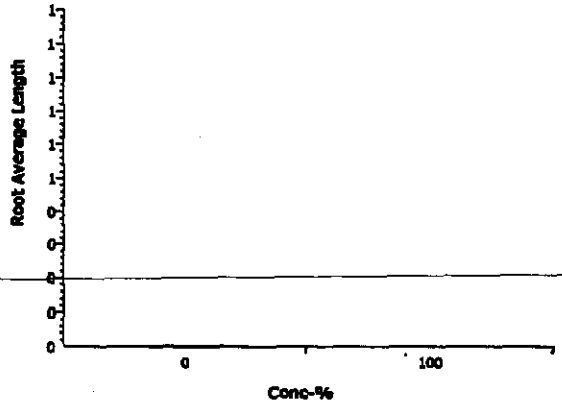
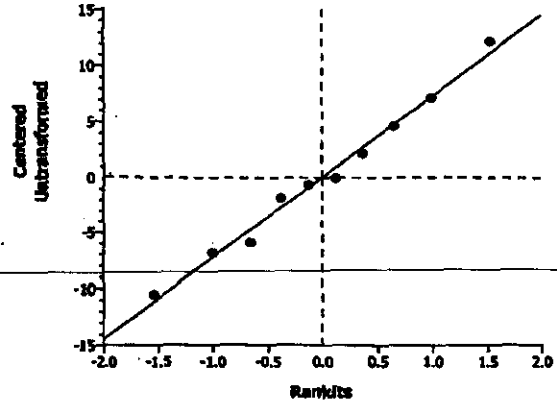




CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Wet Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	45.20%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.81841	1.85955	0.2184	51.1856	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1268.721	1268.721	1	0.67	0.43682	Non-Significant Effect
Error	15153.4	1894.175	8			
Total	16422.1190	3162.8954	9			

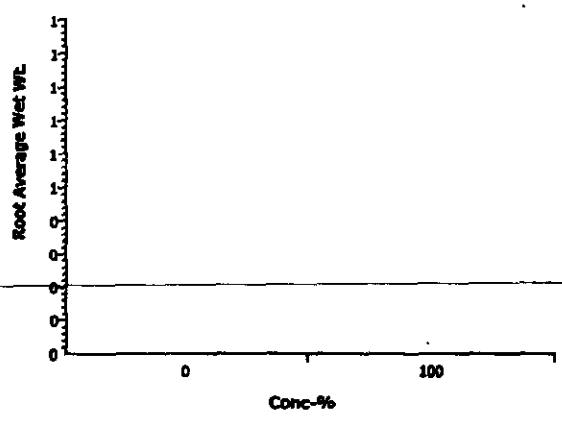
ANOVA Assumptions

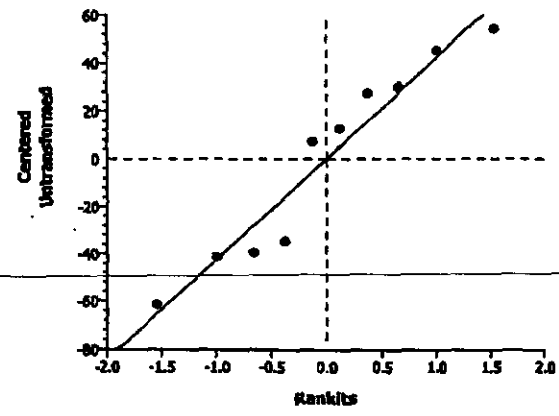
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.54599	23.15450	0.68325	Equal Variances
Distribution	Shapiro-Wilk W	0.91570		0.32247	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	113.23	51.638	158.52	47.962				
100		5	90.707	51.115	145.1	38.574				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	43.16%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	1.38453	1.85955	0.1018	8.72574	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	105.52	105.52	1	1.92	0.20359	Non-Significant Effect
Error	440.3715	55.04644	8			
Total	545.891441	160.56639	9			

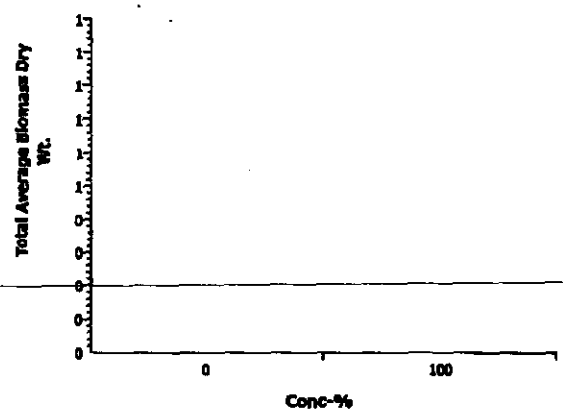
ANOVA Assumptions

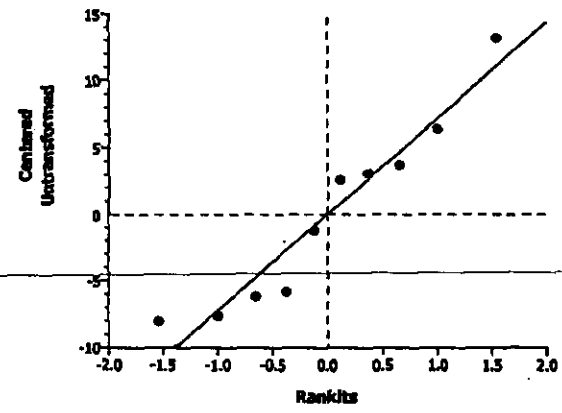
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.39308	23.15450	0.41876	Equal Variances
Distribution	Shapiro-Wilk W	0.91918		0.35017	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	20.217	12.223	33.384	8.8117				
100		5	13.721	7.5450	20.11	5.6962				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	01-8369-8444	01-8369-8444	10 Mar-06 3:43 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	40.21%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.92492	1.85955	0.1910	71.2307	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3138.11	3138.11	1	0.86	0.38206	Non-Significant Effect
Error	29346.01	3668.251	8			
Total	32484.1157	6806.3606	9			

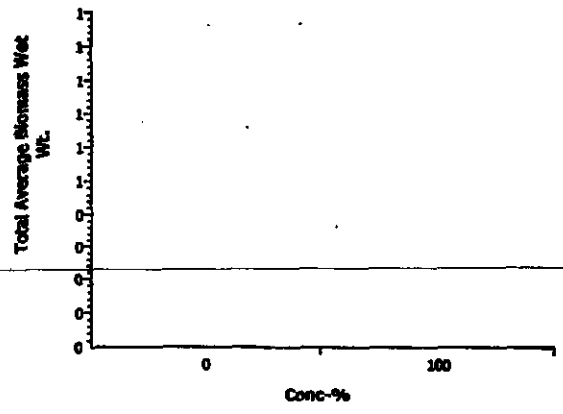
ANOVA Assumptions

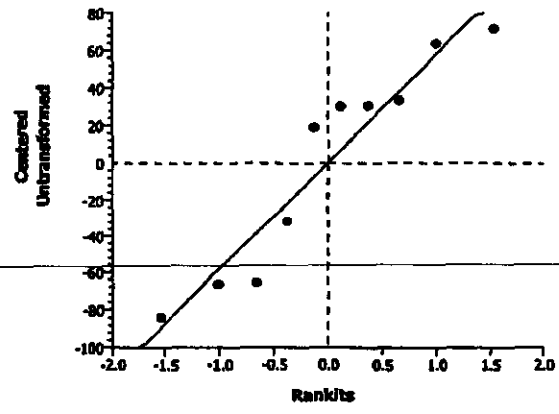
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.15620	23.15450	0.89153	Equal Variances
Distribution	Shapiro-Wilk W	0.88991		0.16917	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	5	177.14	93.113	240.86	58.331				
100		5	141.71	75.185	213.4	62.721				

Graphics





APPENDIX B
CHAIN OF CUSTODY

E 2748

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-3	Page 1 of 1
Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality [ ]
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-131		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 4000g	ST 11/8/05								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

11-1-05 LRC

Sample No.	Matrix *	Sample Date	Sample Time										
~~J10DV0~~ J10DW4	SOIL	10-31-05	1530	X	X								
~~J10DW0~~	SOIL												
~~J10DW1~~	SOIL												
~~J10DW2~~	SOIL												
J~~10DW3~~	SOIL												

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 11-1-05 @ 1005	Received By/Stored In	Date/Time 11-1-05 10:32
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-01

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E 2801

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-4	Page 1 of 1
Collector: L. COLLOM	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Air Quality: [ ]; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: PIT 23	SAF No.: RC-051	
Ice Chest No.	Field Logbook No.: EL-1596; COA: BESRAS6520	Method of Shipment	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 1000 g	ET 11-8-5								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV4	SOIL	11-8-05	16:00	1	1								~1
J10DV5	SOIL												
J10DV6	SOIL												
J10DV7	SOIL												
J10DV8	SOIL												

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Teiles	11-9-05 12:00	[signature]	11-9-05 12:35
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

ET 11/10/05 as per Rich Weiss

Bioassay ID = B1542-02

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E2131

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-9	Page 1 of 1
Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Upland Backfill Elevated-100-F-2		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS

Potentially Radioactive.

Special Handling and/or Storage

NONE

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
110DT8	SOIL	11/14/05	17:21	1	1							

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth Tepper	Date/Time 11/15/05 11:20	Received By/Stored In Dayna Kaumann	Date/Time 11/15/05 11:01
Relinquished By/Removed From Elizabeth Tepper	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.3; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-03

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

HI-EE-011 (08/29/2005)

E 2846

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-15	Page 1 of 1
Collector: L.COLLOM	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: Upland Native Reference-Central Plateau	SAF No.: RC-051	Air Quality:
Ice Chest No.	Field Logbook No.: EL-1596; COA: BESRAS6520	Method of Shipment	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See Item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV2	SOIL	11-15-05	20:00	1	1								1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: CH2M Hill Elizabeth Tepper	14:30	NA	
Relinquished By/Removed From: Elizabeth Tepper	11-16-05	Received By/Stored In: [illegible] CH2MHILL	11/16/05 14:31
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-04

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BNI-EE-011 (08/29/2005)

E 2847

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-12	Page 1 of 1
Collector: L. COLLOM	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: Upland Backfill Low-116-DR-1&2	SAF No.: RC-051	Air Quality
Ice Chest No.	Field Logbook No.: EL-1596; COA: BESRAS6520	Method of Shipment	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J10DV1	SOIL	11-15-05	20:05	1	1							-1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	
Relinquished By/Removed From: CH2MHILL Elizabeth Tepper	14:30	Received By/Stored In: NP	Date/Time
Relinquished By/Removed From: Dakota Tepper	11-16-05	Received By/Stored In: [illegible] CH2MHILL	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 11/16/05 14:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-05

Matrix *
S=Soil
SD=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

HI-5011 (08/29/2005)

E2857

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-16	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Upland Native Elevated-JA Jones		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1396	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L — Data Turnaround 45 Days — Air Quality 1

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV3	SOIL	11/16/05	15:27	1	1								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From: Elizabeth Tejpar	11/17/05 10:00	Received By/Stored In: NA	
Relinquished By/Removed From: Elizabeth Tejpar CH2MHill		Received By/Stored In: Melody Becker	11/17/05 10:15
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-06

Matrix.*
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E28177

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-11	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Elevated-Site #3 Upriver 100-D		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 4000g	LT 11-21-05								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E7172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV0	SOIL	11-21-05	16:00	1	1								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth Tepper CH2MHILL		[illegible]	
Relinquished By/Removed From	Date/Time 9:00	Received By/Stored In	Date/Time
Elizabeth Tepper	11/22/05	[illegible] CH2M	11/22/05
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 9:01
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-07

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 (3/29/2005)

E2897 E2897

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-20	Page 1 of 1
Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Low-Site#10 Downriver 100-D		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

SAMPLE ANALYSIS

CT 11-28-05

Preservation				None	None								
Type of Container				G/P	P/G								
No. of Container(s)				1	1								
Volume				1000g	4000g								
				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
Sample No.	Matrix *	Sample Date	Sample Time										
J10LJ5	SOIL	11-28-05	~~16:19~~ 16:19	1	1								✓

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2MHILL Elizabeth Tepper	Date/Time 1111 16:23 11-28-05	Received By/Stored In Shirley Dudden	Date/Time 11-28-05 16:23
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-08

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
OS=Drum Solids
OL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 3/29/2005)

E2953

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-6	Page 1 of 1
Collector: L COLLOM	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: Riparian Reference-Site #13 Vernita Bridge	SAF No.: RC-051	Air Quality: ☐
Ice Chest No.	Field Logbook No.: EL-1596; COA: BESRAS6520	Method of Shipment	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1	8T								
Volume	1000g	~~5000g~~ 4000g	12								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DT9	SOIL	12-6-05	16:00	X	X								-1

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth Tepper		CH2M Hill	→
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper	12/6/05 16:00	[illegible]	12-6-05 16:15
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-09

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 9/29/2005)

RECEIVED
MAR 2006

BIOASSAY REPORT
ACUTE SCREENING BIOASSAYS
Conducted February 2 through 3
and February 13 though 14, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
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Corvallis, Oregon 97330

March 3, 2006
Lab I.D. Nos. BN1542-01 thru 09
SDG Number BN1542

E2877

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INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project. The tests were conducted in two rounds from February 2 through 3, 2006, and February 13 through 14, 2006.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode Caenorhabditis elegans*, ASTM E 2172-01 (2001).

TEST ORGANISMS

The nematodes used were obtained from CH2M HILL's in-house cultures and were age synchronized as 4 day old organisms at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the ASTM protocol. The test organisms appeared vigorous and in good condition prior to testing.

CONTROL SOIL

The control soil used in the tests was 70 grade silica sand.

HYDRATION WATER

The water used to hydrate the control and test soils was Milli-Q equivalent de-ionized water.

TEST CONCENTRATIONS

The concentrations tested in the nematode test were 100 percent test sample with control soil alone for the control. For the nematode test, 30 organisms per concentration were used with three test chambers per concentration and 10 organisms per chamber.

SAMPLE COLLECTION

The soil samples were collected from October 31, 2005, through December 6, 2005. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

Table 1 provides a cross-reference of the Client ID numbers, sampling dates, sampling locations, Nematode test sample identification (SDG) numbers, and Analytical Lab SDG numbers.

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J10DW4	10/31/2005	600-131	BN1542-01	E2748
J10DV4	11/08/2005	PIT 23	BN1542-02	E2801
J10DT8	11/14/2005	Upland Backfill Elevated-100-F-2	BN1542-03	E2831
J10DV2	11/15/2005	Upland Native Reference-Central Plateau	BN1542-04	E2846
J10DV1	11/15/2005	Upland Backfill Low-116-DR-1&2	BN1542-05	E2847
J10DV3	11/16/2005	Upland Native Elevated-JA Jones	BN1542-06	E2857
J10DV0	11/21/2005	Riparian Elevated-Site #3 Upriver 100-D	BN1542-07	E2877
J10LJ5	11/28/2005	Riparin Low-Site #10 Downriver 100-D	BN1542-08	E2897
J10DT9	12/06/2005	Riparian Reference-Site #13 Vernita Bridge	BN1542-09	E2953

SAMPLE PREPARATION

Test soils and control soil were dried and homogenized prior to use. For each replicate, 2.33 g dry weight of soil was added to each test chamber. The soils were then hydrated to 40 percent of the dry weight by addition of hydration water (0.93 ml) and test chambers were then covered. In addition, 23.3 g of soil was added to a surrogate chamber and hydrated to provide for pH measurements. All test chambers were allowed to equilibrate at test conditions for seven days prior to test initiation.

TEST INITIATION

Tests were initiated by the addition of 10 test organisms to each test chamber. Organisms were added to test chambers in random order.

TEST TERMINATION

Tests were terminated after 24 hours. The contents of the test chambers were added to a centrifuge tube, 10 ml of Ludox-AM silica solution added, and each tube was hand shaken to suspend the nematodes into the Ludox solution. The tubes were then centrifuged to concentrate the soil and the supernatant transferred to a 15 cm petri dish and allowed to sit for 15 minutes. The petri dish was then placed under a dissecting microscope and the nematodes were retrieved and inspected. The recovered test organisms were recorded as alive (responded with independent movement to tactile stimulation) or dead. Missing or un-recovered test organisms are scored as dead during data analysis.

TEST ACCEPTABILITY CRITERIA

The test must meet the following two test acceptability criteria to be considered valid:

- A minimum of 80 percent of test organisms must be recovered, both in the control and each test concentration tested.
- The controls must achieve a minimum 90 percent survival.

MONITORING OF BIOASSAYS

The soil pH was measured from surrogate test chambers at test initiation. Temperature was monitored in the test incubator at test initiation and termination.

DATA ANALYSIS

The endpoints measured during the nematode test included survival over the 24 hour exposure period. The statistical analyses performed were those outlined in *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode Caenorhabditis elegans*, ASTM E 2172-01, using CETIS version 1.1.2. Equal Variance t Two-Sample Test was used to compare the survival data between the control and each test soil. When the assumptions of normality or homogeneity of variance necessary for Equal variance t Two-Sample Test could not be met, Unequal Variance t Two-Sample Test was used to analyze the data.

RESULTS AND DISCUSSION

ACUTE RESULTS

Table 2 summarizes the survival data for the nematode acute test initiated on February 2, 2006.

Table 2
***Caenorhabditis elegans* Results**
Test initiated on February 2, 2006

Client ID	Percent Survival	Percent Recovered
Control	90.0	100
J10DV1	63.3 [a]	86.7
J10DV3	90.0	97.7
J10DV0	56.7 [a]	90.0
J10LJ5	80.0	96.7
J10DT9	76.7	93.3

[a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test.

The nematode results indicated no statistically significant reduction in survival in the J10DV3, J10LJ5, and J10DT9 samples and a statistically significant reduction in survival in the J10DV1 and J10DV0 samples when compared to the control.

Test acceptability criteria was met with control survival of 90.0 percent and recovery of test organisms was greater than 80 percent in all test concentrations.

Table 3 summarizes the survival data for the nematode acute test initiated on February 13, 2006.

Table 3 *Caenorhabditis elegans* Results Test initiated on February 13, 2006		
Client ID	**Percent Survival**	**Percent Recovered**
Control	90.0	96.7
J10DW4	90.0	93.3
J10DV4	83.3	86.7
J10DT8	73.3 [a]	83.3
J10DV2	83.3	93.3
[a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test.		

The nematode results indicated no statistically significant reduction in survival in the J10DW4, J10DV4, and J10DV2 samples and a statistically significant reduction in survival in the J10DT8 sample when compared to the control.

Test acceptability criteria was met with control survival of 90.0 percent and recovery of test organisms was greater than 80 percent in all test concentrations.

Test temperatures remained at 20±1°C. The tests proceeded without interruption or incidents that could have affected test results.

REFERENCE TOXICANT TEST

The results of the reference toxicant test conducted in January with cupric chloride indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1994). The LC_{50} value and control chart limits are listed in the table below.

Table 4
Chronic Reference Toxicant Tests (ug/L)

Species (test)	LC_{50}	Control Chart Limits
Caenorhabditis elegans (survival)	98.2	52.3 to 120.1

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the Statement of Work, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature:

APPENDIX A
RAW DATA SHEETS

CH2M. //TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client Hanford | Tech. 0 Hrs NJ | 24 Hrs NJ | Beginning, Date 2-2-06 | Time 0850

Sample Description see below | Time 0 Hrs 0850 | 24 Hrs 0835 | Ending, Date 2-3-06 | Time 0835

Test Speci *Caenorhabditis elegans* | ID#: Nem007

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments:
						All test soils were dried during sampling process.
Lab Control				19.3	21.3	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of sry wt.).
E284701				19.5	21.3	Samples hydrated 7 days prior to test initiation.
E285701				19.3	21.3	* SAMPLES HAD ADDITIONAL 0.50 ml Milli-Q water on 1-31 /
E287701				19.3	21.3	covered edges w/ Parafilm. Noted samples almost dry.
E289701				19.3	21.3	
E295301				19.3	21.3	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	70 grade Silica sand	A	8	E289701	J10L55	A	11				0
Lab Control	70 grade Silica sand	B	18	E289701	31542-09	B	13				0
Lab Control	70 grade Silica sand	C	3	E289701		C	4				0
E284701	J10DV1	A	15	E295301	J10DT9	A	17				0
E284701	31542-05	B	14	E295301	31542-09	B	9				0
E284701		C	16	E295301		C	7				0
E285701	J10DV3	A	2				0				0
E285701	31542-06	B	5				0				0
E285701		C	6				0				0
E287701	J10DV0	A	1				0				0
E287701	31542-07	B	12				0				0
E287701		C	10				0				0

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client: Hanford
Sample Description: Lab ID#: see Assignment Data sheet
Test Species: *Caenorhabditis elegans* ID#: Nem 007

Beginning, Date 2-2-06 Time 0850
Ending, Date 2-3-06 Time 0835

Test Initiation: Tech: Tech: NJT Time: 0850

Test Termination: Tech: Tech: NJT Time: 0835

Chamber Number	Start Count 0	# alive found 24 hr	# dead found 24 hr	Comments:
1	10	6	4	long, thin nematode
2	10	8	2	found in both #1 and #2
3	10	9	1	#4, #9, #11 – 9 foreign
4	10	9	1	nematodes found & not
5	10	10	0	included in final
6	10	9	0	counts of nematodes
7	10	9	0	if not
8	10	9	1	
9	10	8	1	
10	10	7	1	
11	10	7	2	
12	10	4	5	
13	10	8	2	
14	10	7	3	
15	10	7	0	

Chamber Number	Start Count 0	# alive found 24 hr	# dead found 24 hr	Comments:
16	10	5	4	
17	10	6	4	
18	10	9	1	
19	10			
20	10			
21	10			
22	10			
23	10			
24	10			
25	10			
26	10			
27	10			
28	10			
29	10			
30	10			

CETIS Test Summary

Report Date: 16 Feb-06 3:05 PM
Test Link: 09-9781-8693/B154205cea

Nematode 24 hour Acute test — CH2M Hill

Test No:	17-4335-2950	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	02 Feb-06 08:50 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	03 Feb-06 08:35 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	02 Feb-06 08:50 AM	**Brine:**			

Sample No:	06-5742-9955	**Code:**	B1542-05	**Client:**	
Sample Date:	15 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	79d 8h	**Station:**			

Comments: J10DV1, E284701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-1973-5798	% Survival	<100	100	N/A	11.50%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.63333	0.50000	0.70000	0.06667	0.11547	18.23%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.70000	0.70000	0.50000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	09-9781-8693	09-9781-8693	16 Feb-06 3:05 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	11.50%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	4.76008	2.13185	0.0045	0.14622	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1598792	0.159879	1	22.66	0.00890	Significant Effect
Error	0.0282244	0.007056	4			
Total	0.18810356	0.1669353	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4767834000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.63333	0.50000	0.70000	0.11547	0.92257	0.78540	0.99116	0.11879

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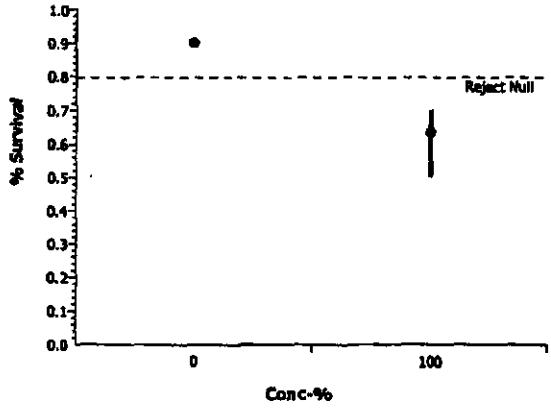

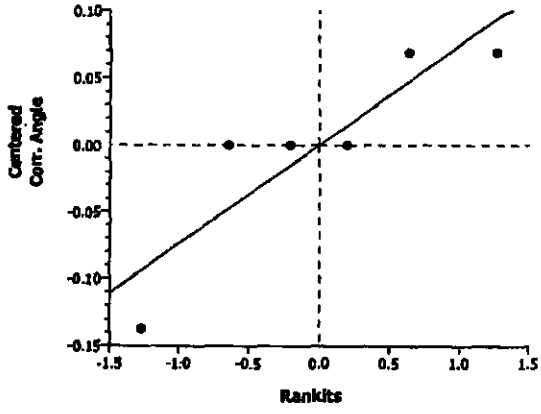

CETIS Test Summary

Report Date: 16 Feb-06 3:25 PM
Test Link: 11-9227-7826/B154206cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	09-5017-4566	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	02 Feb-06 08:50 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	03 Feb-06 08:35 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	02 Feb-06 08:50 AM	**Brine:**			

Sample No:	09-1115-2498	**Code:**	B1542-06	**Client:**	
Sample Date:	16 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	78d 8h	**Station:**			

Comments: J10DV3, E285701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-3091-8870	% Survival	100	> 100	N/A	15.32%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.90000	0.80000	1.00000	0.05774	0.10000	11.11%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.80000	1.00000	0.90000

✓ Bw

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	11-9227-7826	11-9227-7826	16 Feb-06 3:07 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	15.32%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	-0.0798	2.13185	0.5299	0.18777	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.401E-05	7.40E-05	1	0.01	0.94026	Non-Significant Effect
Error	0.0465461	0.011637	4			
Total	0.04662009	0.0117105	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7862854000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.84220		0.13594	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.90000	0.80000	1.00000	0.10000	1.25607	1.10715	1.41202	0.15256

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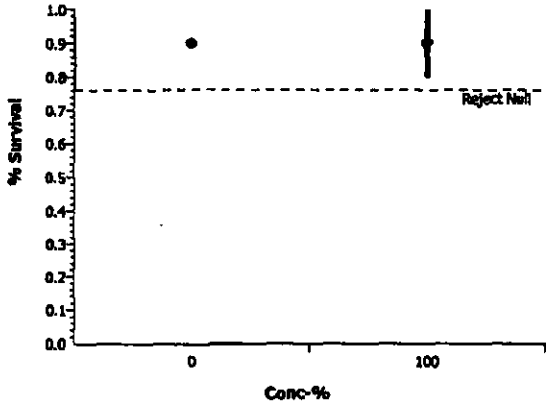

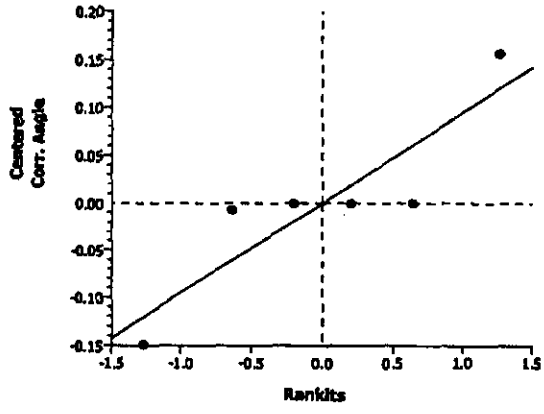

CETIS Test Summary

Report Date: 16 Feb-06 3:08 PM
Test Link: 10-4312-1695/B154207cea

Nematode 24 hour Acute test — CH2M Hill

Test No:	10-7374-9443	Test Type:	Nematode Survival	Duration:	24h
Start Date:	02 Feb-06 08:50 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	03 Feb-06 08:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	02 Feb-06 08:50 AM	Brine:			

Sample No:	05-1608-3151	Code:	B1542-07	Client:	
Sample Date:	21 Nov-05	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	73d 8h	Station:			

Comments: J10DV0, E287701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
02-6442-2122	% Survival	< 100	100	N/A	15.69%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.56667	0.40000	0.70000	0.08819	0.15275	26.96%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.60000	0.40000	0.70000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	10-4312-1695	10-4312-1695	16 Feb-06 3:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	15.69%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	4.39424	2.13185	0.0059	0.19166	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2341103	0.234110	1	19.31	0.01174	Significant Effect
Error	0.0484969	0.012124	4			
Total	0.2826072	0.2462346	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8192392000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.87536		0.24842	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.56667	0.40000	0.70000	0.15275	0.85398	0.68472	0.99116	0.15572

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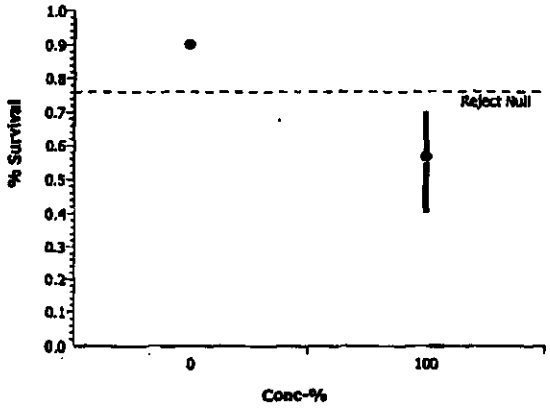
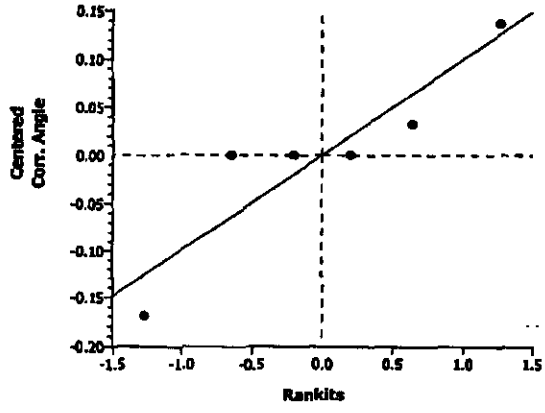




CETIS Test Summary

Report Date: 16 Feb-06 3:09 PM
Test Link: 01-8258-7180/B154208cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	18-5411-2771	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	02 Feb-06 08:50 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	03 Feb-06 08:35 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	02 Feb-06 08:50 AM	**Brine:**			

Sample No:	15-5450-5055	**Code:**	B1542-08	**Client:**	
Sample Date:	28 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	66d 8h	**Station:**			

Comments: J10LJ5, E289701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-2393-1486	% Survival	100	> 100	N/A	12.65%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.80000	0.70000	0.90000	0.05774	0.10000	12.50%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.70000	0.80000	0.90000

✓ Bm

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	01-8258-7180	01-8258-7180	16 Feb-06 3:09 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	12.65%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	1.78704	2.13185	0.0742	0.15897	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0266382	0.026638	1	3.19	0.14846	Non-Significant Effect
Error	0.0333653	0.008341	4			
Total	0.06000343	0.0349795	5			

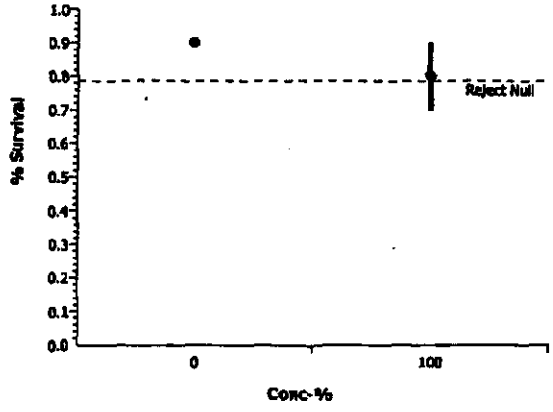
ANOVA Assumptions

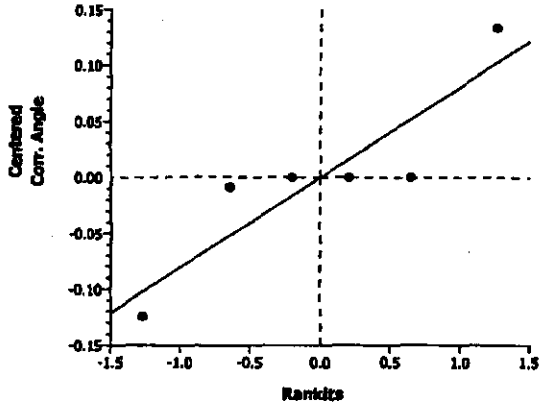
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5636268000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.84832		0.15255	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.80000	0.70000	0.90000	0.10000	1.11578	0.99116	1.24905	0.12916

Graphics





CETIS Test Summary

Report Date: 16 Feb-06 3:11 PM
Test Link: 03-7488-5492/B154209cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	16-2208-0421	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	02 Feb-06 08:50 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	03 Feb-06 08:35 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	02 Feb-06 08:50 AM	**Brine:**			

Sample No:	07-3184-0122	**Code:**	B1542-09	**Client:**	
Sample Date:	06 Dec-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	58d 8h	**Station:**			

Comments: J10DT9, E295301

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-5863-3854	% Survival	100	> 100	N/A	18.94%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.76667	0.60000	0.90000	0.08819	0.15275	19.92%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.60000	0.80000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	03-7488-5492	03-7488-5492	16 Feb-06 3:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	18.94%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	1.59353	2.13185	0.0931	0.22514	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0424816	0.042482	1	2.54	0.18626	Non-Significant Effect
Error	0.0669179	0.016729	4			
Total	0.10939945	0.0592110	5			

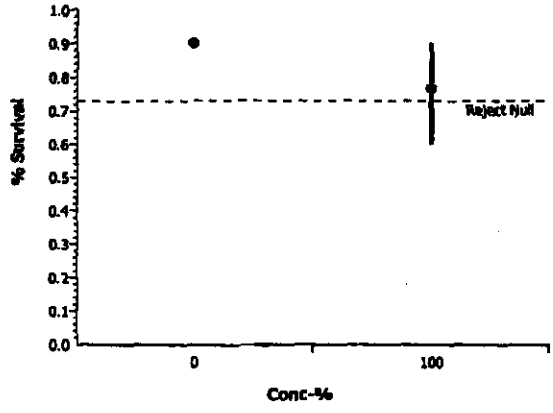
ANOVA Assumptions

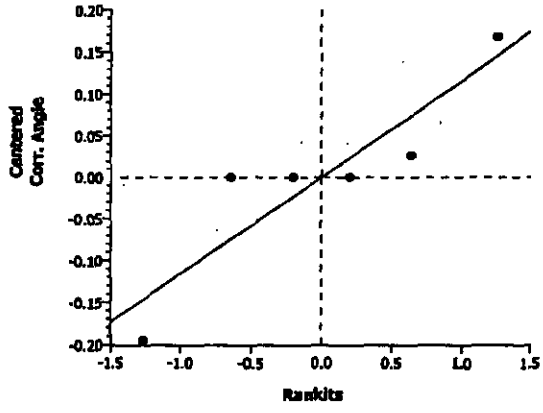
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1130419000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.86641		0.21226	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.76667	0.60000	0.90000	0.15275	1.08076	0.88608	1.24905	0.18292

Graphics





CHEM... /ITODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client Hanford | Tech. 0 Hrs NJ | 24 Hrs NJ | Beginning, Date 2-13-06 | Time 0830

Sample Description see below | Time 0 Hrs 0830 | 24 Hrs 0830 | Ending, Date 2-14-06 | Time 0830

Test Speci *Caenorhabditis elegans* | ID#: Nem 008

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments:
						All test soils were dried during sampling process.
Lab Control	7.1			21.4	20.8	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of sry wt.).
E274801	7.6			21.4	20.8	Samples hydrated 7 days prior to test initiation.
E280101	7.5			21.4	20.8	
E283101	7.2			21.4	20.8	
E284601	6.5			21.4	20.8	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	70 grade Silica sand	A	1	E284601	J10DV2	A	13			0	
Lab Control	70 grade Silica sand	B	14	E284601	B1542-04	B	8				
Lab Control	70 grade Silica sand	C	4	E284601		C	10				
E274801	J10DV4	A	11								
E274801	B1542-01	B	15								
E274801		C	3								
E280101	J10DV4, J10DV5, J10DV6,	A	2								
E280101	J10DV7, J10DV8	B	5								
E280101	B1542-02	C	6								
E283101	J10DT8	A	12								
E283101	B1542-03	B	7								
E283101		C	9								

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client Hanford

Sample Description Lab ID#: see Assignment Data sheet

Test Species: *Caenorhabditis elegans* ID#: Nem008

Beginning, Date 2-13-06 Time 0830

Ending, Date 2-14-06 Time 0830

Test Initiation: Tech: Tech: NJ Time: 0830

Test Termination: Tech: Tech: NJ Time: 0830

Chamber Number	Start Count 0	# alive found 24 hr	# dead found 24 hr	Comments:
1	10	9	1	
2	10	8	0	
3	10	9	1	
4	10	9	1	
5	10	9	1	
6	10	8	0	
7	10	8	0	
8	10	8	1	
9	10	7	1	
10	10	9	1	
11	10	9	0	
12	10	7	2	
13	10	8	1	
14	10	9	0	
15	10	9	0	

Chamber Number	Start Count 0	# alive found 24 hr	# dead found 24 hr	Comments:
16	10			
17	10			
18	10			
19	10			
20	10			
21	10			
22	10			
23	10			
24	10			
25	10			
26	10			
27	10			
28	10			
29	10			
30	10			

CETIS Test Summary

Report Date: 16 Feb-06 2:52 PM
Test Link: 04-9550-2436/B154201cea

Nematode 24 hour Acute test — **CH2M HILL**

Test No:	05-4016-1968	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	13 Feb-06 08:30 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	14 Feb-06 08:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	30 Jan-06 10:30 AM	**Brine:**			

Sample No:	18-1426-8954	**Code:**	B1542-01	**Client:**	
Sample Date:	31 Oct-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	91d 10h	**Station:**			

Comments: J10DW4, E274801

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-8964-2763	% Survival	100	> 100	N/A	0.00%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.90000	0.90000	0.90000

/ 3~

Analyst: D~ Approval: _____

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	04-9550-2436	04-9550-2436	16 Feb-06 2:52 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	0.00%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	0	2.13185	0.5000	3E-08	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0	0	1	0.00	1.00000	Non-Significant Effect
Error	1.776E-15	4.44E-16	4			
Total	1.7764E-15	4.441E-16	5			

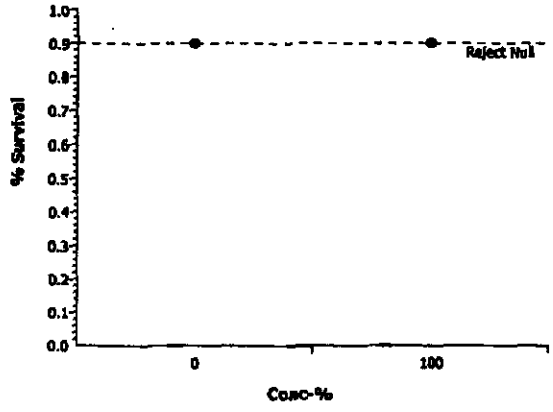
ANOVA Assumptions

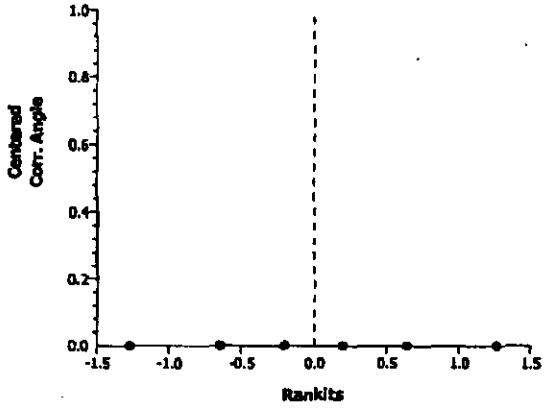
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	199.00000	1.00000	Equal Variances

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016

Graphics





CETIS Test Summary

Report Date: 16 Feb-06 2:55 PM
Test Link: 07-1342-3910/B154202cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	10-6949-0572	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	13 Feb-06 08:30 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	14 Feb-06 08:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	13 Feb-06 08:30 AM	**Brine:**			

Sample No:	07-3307-9513	**Code:**	B1542-02	**Client:**	
Sample Date:	08 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	97d 8h	**Station:**			

Comments: J10DV4, J10DV5, J10DV6, J10DV7, J10DV8.
E280101

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
01-5013-5976	% Survival	100	> 100	N/A	7.58%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.83333	0.80000	0.90000	0.03333	0.05774	6.93%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.80000	0.90000	0.80000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	07-1342-3910	07-1342-3910	16 Feb-06 2:55 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	7.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	2	2.13185	0.0581	0.10083	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0134232	0.013423	1	4.00	0.11612	Non-Significant Effect
Error	0.0134232	0.003356	4			
Total	0.02684637	0.016779	5			

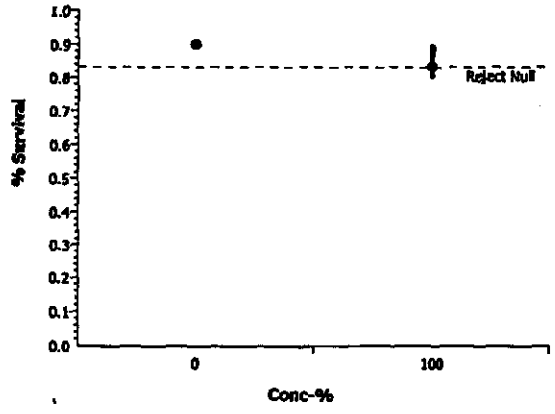
ANOVA Assumptions

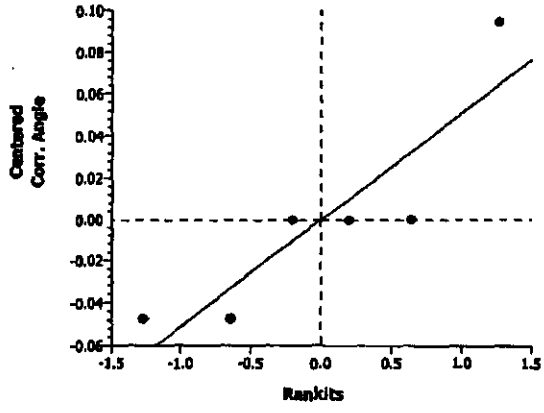
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2267526000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.83333	0.80000	0.90000	0.05774	1.15445	1.10715	1.24905	0.08192

Graphics





CETIS Test Summary

Report Date: 16 Feb-06 3:00 PM
Test Link: 01-6976-7512/B154203cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	13-3323-9275	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	13 Feb-06 08:30 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	14 Feb-06 08:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	13 Feb-06 08:30 AM	**Brine:**			

Sample No:	15-5457-5144	**Code:**	B1542-03	**Client:**	
Sample Date:	14 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	91d 8h	**Station:**			

Comments: J10DT8, E283101

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-2471-0884	% Survival	< 100	100	N/A	6.07%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.73333	0.70000	0.80000	0.03333	0.05774	7.87%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.70000	0.80000	0.70000

✓ B

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	01-6976-7512	01-6976-7512	16 Feb-06 3:00 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	6.07%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	5.67000	2.13185	0.0024	0.08243	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0720895	0.072089	1	32.15	0.00477	Significant Effect
Error	0.0089894	0.002242	4			
Total	0.08105894	0.0743319	5			

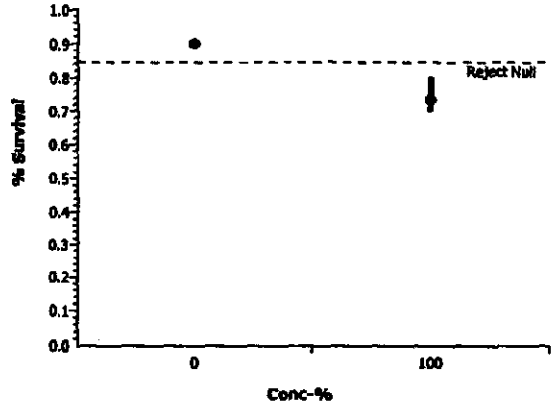
ANOVA Assumptions

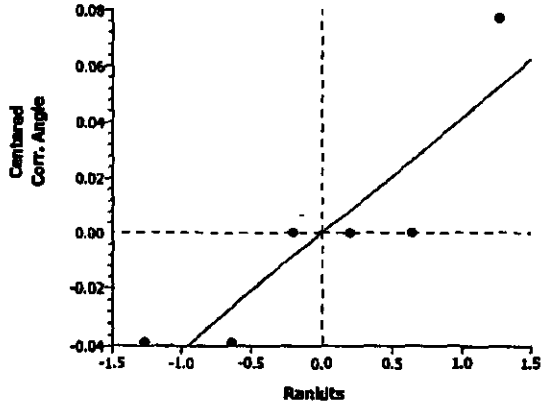
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1515175000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.73333	0.70000	0.80000	0.05774	1.02982	0.99116	1.10715	0.06697

Graphics





CETIS Test Summary

Report Date: 16 Feb-06 3:02 PM
Test Link: 10-6481-1341/B154204cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	04-3389-1423	**Test Type:**	Nematode Survival	**Duration:**	24h
Start Date:	13 Feb-06 08:30 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	14 Feb-06 08:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	13 Feb-06 08:30 AM	**Brine:**			

Sample No:	09-5315-2344	**Code:**	B1542-04	**Client:**	
Sample Date:	15 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	90d 8h	**Station:**			

Comments: J10DV2, E284601

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-5921-2719	% Survival	100	> 100	N/A	7.58%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Control Sed	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.83333	0.80000	0.90000	0.03333	0.05774	6.93%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Control Sed	0.90000	0.90000	0.90000
100		0.80000	0.80000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	10-6481-1341	10-6481-1341	16 Feb-06 3:02 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	7.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	2	2.13185	0.0581	0.10083	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0134232	0.013423	1	4.00	0.11612	Non-Significant Effect
Error	0.0134232	0.003356	4			
Total	0.02684637	0.016779	5			

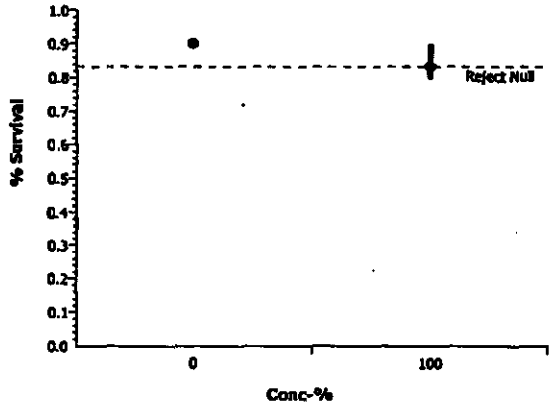
ANOVA Assumptions

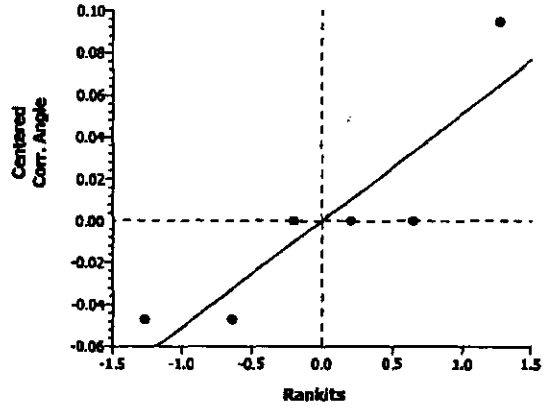
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2267528000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.83333	0.80000	0.90000	0.05774	1.15445	1.10715	1.24905	0.08192

Graphics





WASHINGTON HANFORD CLOSURE CROSS REFERENCE

DATE	SDG	CLIENT ID	SAMPLING LOCATION
10/31/2005	E2748	J10DW4	600-131
11/08/2005	E2801	J10DV4	PIT 23
11/14/2005	E2831	J10DT8	Upland Backfill Elevated-100-F-2
11/15/2005	E2846	J10DV2	Upland Native Reference-Central Plateau
11/15/2005	E2847	J10DV1	Upland Backfill Low-116-DR-1&2
11/16/2005	E2857	J10DV3	Upland Native Elevated-JA Jones
11/21/2005	E2877	J10DV0	Riparian Elevated-Site # 3 Upriver 100-D
11/28/2005	E2897	J10LJ5	Riparian Low-Site # 10 Downriver 100-D
12/06/2005	E2953	J10DT9	Riparian Reference-Site # 13 Vernita Bridge

APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client QA / QC
Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B 033-08
Species: *Caenorhabditis elegans* ID#: Nem 005

Beginning, Date 1-23-06 Time 1330
Ending, Date 1-24-06 Time 11:30

Test Initiation: Tech: Tech: NJ Time: 1330 Test Termination: Tech: Tech: NJ Time: 1130

Chamber Number	Start Count 0	# alive found 24 hr	# dead found 24 hr	Comments:
1	10	10	0	
2	10	6	4	
3	10	6	4	
4	10	10	0	
5	10	10	0	
6	10	7	3	
7	10	0	10	
8	10	2	8	
9	10	6	4	
10	10	9	1	
11	10	6	4	
12	10	5	5	
13	10	4	6	
14	10	10	0	
15	10	10	0	

Endpoint	LC50	Cusum Chart Limits
Survival	98.2	52.3 to 120.1

Task Manager Natisha Johnson

Project Manager [signature]

QA Officer [signature]

CH2M HILL

ODE TOXICITY TEST SOIL QUALITY AND TEST CHAM ER ASSIGNMENT DATA

Client QA / QC

Sample Description sec below

Test Specie *Caenorhabditis elegans* ID#: Nem

Tech. 0 Hrs NJ 24 Hrs NJ

Time 0 Hrs 1330 24 Hrs 1130

Beginning, Date 1-23-06 Time 1530

Ending, Date 1-24-06 Time 1130

Lab ID	K-Medium pH		% Moisture	Temperature (°C)		Comments:
	0 hr	24 hr	0 hr	0 hr	24 hr	
Lab Control	5.5	5.7	NA	19.9		
10 mg/L Cu	5.2	5.0	NA	19.9		
50 mg/L Cu	5.2	4.8	NA	20.0		
100 mg/L Cu	5.1	4.8	NA	20.1		
250 mg/L Cu	4.8	4.~~8~~ 4	NA	20.1		

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	K-medium	A	15	250 mg/L Cu		A	7				
Lab Control	K-medium	B	10	250 mg/L Cu		B	13				
Lab Control	K-medium	C	4	250 mg/L Cu		C	8				
10 mg/L Cu		A	5								
10 mg/L Cu		B	14								
10 mg/L Cu		C	1								
50 mg/L Cu		A	2								
50 mg/L Cu		B	3								
50 mg/L Cu		C	6								
100 mg/L Cu		A	11								
100 mg/L Cu		B	9								
100 mg/L Cu		C	12								

CETIS Test Summary

Report Date: 26 Jan-06 2:57 PM
Test Link: 18-9490-9699/rcea005

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	03-9544-7078	Test Type:	Nematode Survival	Duration:	22h
Start Date:	23 Jan-06 01:30 PM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	24 Jan-06 11:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	23 Jan-06 01:30 PM	Brine:			

Sample No:	13-1507-4495	Material:	Copper	Client:	
Sample Date:	23 Jan-06	Code:	1B033-08	Project:	
Receive Date:	26 Jan-06 02:55 PM	Source:	Reference Toxicant		
Sample Age:	14h	Station:			

Comments: as CuSO4x5H2O

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
07-3093-8444	% Survival	50	98.16186	67.39882	142.9662	Trimmed Spearman-Karber

% Survival Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%
10		3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		3	0.63333	0.60000	0.70000	0.03333	0.05774	9.12%
100		3	0.56667	0.50000	0.60000	0.03333	0.05774	10.19%
250		3	0.20000	0.00000	0.40000	0.11547	0.20000	100.00

% Survival Detail

Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1.00000	0.90000	1.00000
0		1.00000	1.00000	1.00000
50		0.60000	0.60000	0.70000
100		0.60000	0.60000	0.50000
250		0.00000	0.40000	0.20000

CETIS Analysis Detail

Report Date: 26 Jan-06 2:57 PM
Analysis: 07-3093-8444/rcea005

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Trimmed Spearman-Karber	18-9490-9699	18-9490-9699	26 Jan-06 2:57 PM	CETISv1.1.1

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim	μ	σ
Control Threshold	0.03333334	20.34%	1.991943	0.08164523

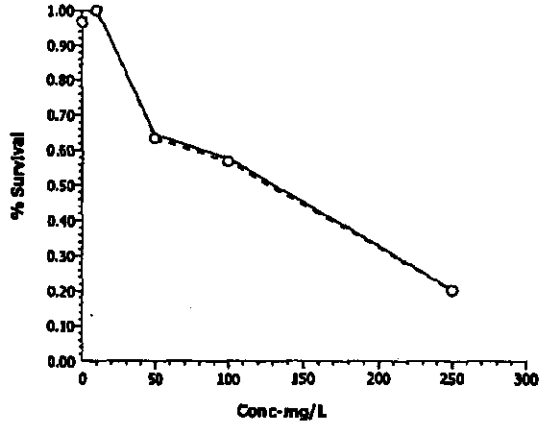
Point Estimates

EC50/LC50	95% LCL	95% UCL
98.16186	67.39882	142.96620

Data Summary

Conc-mg/	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30
10		3	1.00000	1.00000	1.00000	0.00000	0.00000	30	30
50		3	0.63333	0.60000	0.70000	0.01179	0.05773	19	30
100		3	0.56667	0.50000	0.60000	0.01179	0.05773	17	30
250		3	0.20000	0.00000	0.40000	0.04082	0.20000	6	30

Graphics



APPENDIX C
CHAIN OF CUSTODY

E 2778

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-3	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-131		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality [ ]

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~2000g~~ 4000g									

SAMPLE ANALYSIS

11-1-05 LRC

				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
Sample No.	Matrix *	Sample Date	Sample Time										
~~J10DW0~~ J10DW4	SOIL	10-31-05	1530	X	X								
~~J10DW0~~	SOIL												
~~J10DW1~~	SOIL												
~~J10DW2~~	SOIL												
J~~10DW3~~	SOIL												

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 11-1-05 0800	Received By/Stored In	Date/Time 11-1-05 10:3
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-01

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BH-EE-011 (08/29/2005)

E 2801

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-4	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality [ ]	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location PIT 23		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 4000g	ET 11-8-5								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV4	SOIL	11-8-05	16:00	1	1								~1
J10DV5	SOIL												
J10DV6	SOIL												
J10DV7	SOIL												
J10DV8	SOIL												

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Jeffs	11-9-05 12:00	[illegible]	11-9-05 12:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

ET 11/10/05 As per Rich Weiss

Bioassay ID = B1542-02

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wt=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BW

BHI-EE-011 (08/29/2005)

E2P31

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-9	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCRA - Incremental So	Sampling Location Upland Backfill Elevated-100-F-2		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS

Potentially Radioactive.

Special Handling and/or Storage

NONE

Preservation	None	None
Type of Container	G/P	P/G
No. of Container(s)	1	1
Volume	1000g	4000g
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172

Sample No.	Matrix *	Sample Date	Sample Time		
J10DT8	SOIL	11/14/05	17:21	1	1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth Tepper	Date/Time 11/15/05 11:00	Received By/Stored In Dayna Kaumann	Date/Time 11/15/05 11:01
Relinquished By/Removed From Elizabeth Tepper	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-03

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
OS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E 2846

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-15	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Upland Native Reference-Central Plateau		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	400g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV2	SOIL	11-15-05	20:00	1	1								1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From Elizabeth Tepper	CH2M Hill 14:30	Received By/Stored In NA	
Relinquished By/Removed From Elizabeth Tepper	11-16-05	Received By/Stored In Raymond Kennard CH2MHILL	11/16/05 14:31
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-04

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E 2847

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-12	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Price Code 8L Air Quality	Data Turnaround 45 Days		
Project Designation 100 & 300 Area Component of the RCDRA - Incremental So	Sampling Location Upland Backfill Low-116-DR-1&2		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV1	SOIL	11-15-05	20:05	1	1								-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2MHill Elizabeth Tepper	Date/Time 14:30	Received By/Stored In NP	Date/Time
Relinquished By/Removed From Elizabeth Tepper	Date/Time 11-16-05	Received By/Stored In [illegible] CH2MHill	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 11/16/05 14:31
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-05

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EP-011 (08/29/2005)

E2851

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-16	Page 1 of 1
Collector: L. COLLOM	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: Upland Native Elevated-JA Jones	SAF No.: RC-051	Air Quality: [ ]
Ice Chest No.	Field Logbook No.: EL-1596; COA: BESRAS6520	Method of Shipment	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV3	SOIL	11/16/05	15:27	1	1								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From: Elizabeth Tepper	Date/Time: 11/17/05 10:00	Received By/Stored In: NA	Date/Time:
Relinquished By/Removed From: Elizabeth Tepper CH2MHill	Date/Time:	Received By/Stored In: Melody Becker	Date/Time: 11-17-05 10:15
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-06

Matrix.*
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

E287

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-11	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Price Code 8L	Data Turnaround 45 Days	Air Quality	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Elevated-Site #3 Upriver 100-D		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 4000g	ST 11-21-05								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV0	SOIL	11-21-05	16:00	1	1								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth Tepper CH2MHill			
Relinquished By/Removed From	Date/Time 9:00	Received By/Stored In	Date/Time
Elizabeth Tepper	11/22/05		11/22/05
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 9:01
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-07

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 9/29/2005)

E2897 E 397

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-20	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Price Code 8L	Data Turnaround 45 Days	Air Quality ☐	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Low-Site#10 Downriver 100-D		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

CT 11-28-05

Sample No.	Matrix *	Sample Date	Sample Time										
J1CLJ5	SOIL	11-28-05	~~16:19~~ 16:19	1	1								-1

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From CH2MHILL Elizabeth Tepper	Date/Time ~~16:25~~ 11-28-05	Received By/Stored In Mindy Butler	Date/Time 11-28-05 16:25
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-08

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 3/29/2005)

E2900 EZ 53

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-6	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Reference-Site #13 Vernita Bridge		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1	ET 05									
Volume	1000g	~~3000g~~ 4000g	12-06									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J100T9	SOIL	12-6-05	16:00	X	X							-1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth Tepper		CH2M Hill	→
Relinquished By/Removed From: Elizabeth M Tepper	12/6/05 16:00	[illegible]	12-6-05 16:15
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-09

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 (9/29/2005)

CH2M HILL
Applied Sciences Laboratory
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL
Applied Sciences Laboratory

February 8, 2006

Washington Closure Hanford

334247.AO.ZZ

RE: Laboratory Report for Washington Closure Hanford
Applied Sciences Laboratory Reference No. E2877

Joan Kessner/WCH:

On November 22, 2005, CH2M HILL Applied Sciences Laboratory received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Elizabeth Tepper at (541) 758-0235, extension 3127.

Sincerely,

Elizabeth M Tepper

Elizabeth Tepper
Analytical Manager

Enclosures

RECEIVED
FEB 2006

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Laboratory Reference No. E2877

Sample ID	Client Sample ID	Date Collected	Time Collected
E287701	J10DV0	11/21/2005	16:00

Table of Contents
CH2M HILL Laboratory Reference No. E2877

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QC Summary 10

Anions Analysis by Method E300.0 20
Sample Data Summary 22
QC Summary 25

Moisture Analysis by Method ASTM D2216 36

Particle Size Analysis by Method D422 38

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Sample Data Summary 45
QC Summary 48

Total Organic Carbon Analysis by Method SW9060 58
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QC Summary 64

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Applied Sciences Laboratory

Organic CLP and CLP Like Data Qualifiers

U — The analyte was analyzed for, but not detected above the reported sample quantitation limit.

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ — The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

N — The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ — The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

P — The primary and confirmation analyte result recoveries do not match.

E — The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.

R — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Inorganic CLP and CLP Like Data Qualifiers

U — The analyte was analyzed for, but not detected above the reported sample quantitation limit.

B — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ — The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

E — The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.

N — The matrix spike/matrix spike duplicate recovery for the analyte is outside of acceptance criteria—qualifier is applied to the native sample only.

R — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

AMMONIA
METHOD EPA 350.3

CASE NARRATIVE
AMMONIA

Analytical Method: EPA 350.3 Batch No.: E2877

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 336761.AO.Z Z

Project Name: Washington Closure Hanford Prime Contractor.: _____

I. Holding Times:
All aeceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth M Tepe Date: 1/19/06

Reviewed by: Amber Saylor Date: 1/23/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.510	1.91	0.712	B	mg/kg	1	1.057 G	E350.3	11/29/05

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1129

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1129

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.534	2.00	1.09	B	mg/kg	1	1 G	E350.3	11/29/05

QC DATA
SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 11/29/05 11:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Ammonia-N	0.10	149	1.0	95.1	10.0	39.9	100	-13						

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 11/29/05 11:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Analyte	Curve Type	r	Q
Ammonia-N	LNR	0.9999	

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Second Source ID: ICV-1129

Analyte	Expected	Found	%D	Q
Ammonia-N	1	1.07	7.0	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Analytical Lot ID: 112905NH3

CCV #1 ID: CV1-1129 CCV #2 ID: CV2-1129 CCV #3 ID: CV3-1129

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	0.1	0.0997	-0.3		1	0.989	-1.1		1	0.845	-15.5	

COMMENTS:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Analytical Lot ID: 112905NH3

CCV #4 ID: CV4-1129 CCV #5 ID: CCV #6 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	1	0.807	-19.3									

COMMENTS:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1129

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Sample ID: SB1-1129

Initial Cal ID: 112905NH3

Date Analyzed: 11/29/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1226

Instrument: NONE

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
04	BS1S1129	BS1S1129	11/29/05	1222
21	J10DV0	E287701	11/29/05	1358

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2877

Analysis Method: E350.3

Initial Cal ID: 112905NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S1129

Date Analyzed: 11/29/05

Time Analyzed: 1222

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Ammonia-N	20	21.4	107.2	80-120	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 112905NH3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-1129	CV1-1129	11/29/05	1218
02	CV2-1129	CV2-1129	11/29/05	1218
04	BS1S1129	BS1S1129	11/29/05	1222
06	SB1-1129	SB1-1129	11/29/05	1226
17	CV3-1129	CV3-1129	11/29/05	1328
21	J10DV0	E287701	11/29/05	1358
24	CV4-1129	CV4-1129	11/29/05	1424
25	ICV-1129	ICV-1129	11/29/05	1130

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
Applied Sciences Labortory (ASL)
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

01/19/06

MDL Study Report

Analytical Method: E350.3
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Ammonia	08/05/05	2	2.18	1.70	1.73	1.70	1.73	1.74	1.81		0.170	0.534

ET060119-17:58-E2877-W

ANIONS BY METHOD EPA300.0

CASE NARRATIVE
ANIONS

Analytical Method: EPA300.0 Batch No.: E2877

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 334247.AO.ZZ

Base/Command: Washington Closure Prime Contractor.:

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
Samples were analyzed in accordance with SOP.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Analytical Exception:
None.

F. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Date: 1/25/06

Reviewed by: Date: 1/31/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0289	0.595	2.15		mg/kg	1	2.1 G	E300.0A	11/23/05
16984-48-8	Fluoride	0.0258	0.595	0.595	U	mg/kg	1	2.1 G	E300.0A	11/23/05
14797-55-8	Nitrate-N	0.0224	0.595	4.75		mg/kg	1	2.1 G	E300.0A	11/23/05
14797-65-0	Nitrite-N	0.0214	0.595	0.620		mg/kg	1	2.1 G	E300.0A	11/23/05
14808-79-8	Sulfate	0.0384	0.595	4.58		mg/kg	1	2.1 G	E300.0A	11/23/05

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1123

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1123

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0121	0.250	0.0350	B	mg/kg	1	5 G	E300.0A	11/23/05
16984-48-8	Fluoride	0.0109	0.250	0.250	U	mg/kg	1	5 G	E300.0A	11/23/05
14797-55-8	Nitrate-N	0.00939	0.250	0.250	U	mg/kg	1	5 G	E300.0A	11/23/05
14797-65-0	Nitrite-N	0.00898	0.250	0.250	U	mg/kg	1	5 G	E300.0A	11/23/05
14808-79-8	Sulfate	0.0161	0.250	0.250	U	mg/kg	1	5 G	E300.0A	11/23/05

QC DATA SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 07/08/05 11:53

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-070805

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Chloride	0.020	0.0061	0.10	0.015	0.50	0.083	1.0	0.14	5.0	0.78	10.0	1.8		
Fluoride			0.10	0.0031	0.50	0.050	1.0	0.13	5.0	1.0	10.0	2.3		
Nitrate-N	0.020	0.010	0.10	0.034	0.50	0.17	1.0	0.36	5.0	2.1	10.0	4.7		
Nitrite-N	0.020	0.0031	0.10	0.018	0.50	0.10	1.0	0.22	5.0	1.3	10.0	2.7		
Sulfate	0.060	0.0066	0.30	0.028	1.5	0.15	3.0	0.30	15.0	1.7	30.0	3.7		

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 07/08/05 11:53

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-070805

Analyte	Curve Type	r	Q
Chloride	LNR	0.9985	
Fluoride	LNR	0.9976	
Nitrate-N	LNR	0.9985	
Nitrite-N	LNR	0.9997	
Sulfate	LNR	0.9990	

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Instrument Name: ICQ

Concentration Units: MG/L

Initial Calibration ID: 300A-070805

Second Source ID: ICV-0708

Analyte	Expected	Found	%D	Q
Chloride	5	4.78	-4.4	
Fluoride	5	5.21	4.1	
Nitrate-N	32.9	31.3	-5.0	
Nitrite-N	2.86	3.13	9.5	
Sulfate	5	4.96	-0.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Instrument Name: ICQ

Concentration Units: MG/L

Initial Calibration ID: 300A-070805

Analytical Lot ID: 112305Q3

CCV #1 ID: CV1-1123 CCV #2 ID: CV2-1123 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Chloride	5	4.54	-9.2		5	4.55	-9.1					
Fluoride	5	4.51	-9.7		5	4.53	-9.4					
Nitrate-N	5	4.85	-3.0		5	4.87	-2.6					
Nitrite-N	5	5.12	2.3		5	5.13	2.5					
Sulfate	15	14.6	-2.6		15	14.4	-4.1					

COMMENTS: _____

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID: SB1-1123

SDG No.: E2877

Analysis Method: E300.0A

Initial Cal ID: 300A-070805

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1123

Date Analyzed: 11/23/05

Time Analyzed: 1546

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
15	BS1S1123	BS1S1123	11/23/05	1514
16	BS2S1123	BS2S1123	11/23/05	1535
28	J10DV0	E287701	11/23/05	1722

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS1S1123

Initial Cal ID: 300A-070805

Date Analyzed: 11/23/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1514

Instrument: ICQ

Concentration Units: MG/KG

Analyte	Expected	Found	%R	QC Limits %R	Q
Chloride	215	242	112.5	70-130	
Fluoride	306	269	87.9	70-130	
Nitrate-N	243	214	87.8	70-130	
Sulfate	314	223	71.1	70-130	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS2S1123

Initial Cal ID: 300A-070805

Date Analyzed: 11/23/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1535

Instrument: ICQ

Concentration Units: MG/KG

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrite-N	2.86	2.91	101.6	70-130	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 112305Q3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
14	CV1-1123	CV1-1123	11/23/05	1503
15	BS1S1123	BS1S1123	11/23/05	1514
16	BS2S1123	BS2S1123	11/23/05	1535
19	SB1-1123	SB1-1123	11/23/05	1546
28	J10DV0	E287701	11/23/05	1722
29	CV2-1123	CV2-1123	11/23/05	1805

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-070805

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	07/08/05	1049
03	LEVEL2	LEVEL2	07/08/05	1102
04	LEVEL3	LEVEL3	07/08/05	1115
05	LEVEL4	LEVEL4	07/08/05	1127
06	LEVEL5	LEVEL5	07/08/05	1140
07	LEVEL6	LEVEL6	07/08/05	1153
09	ICV-0708	ICV-0708	07/08/05	1218
10	ICV-0708	ICV-0708	07/08/05	1231
12	ICV-0708	ICV-0708	07/08/05	1421

COMMENTS: _____

CH2MHILL
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Telephone: 541-752-4271
Fax: 541-752-0276

01/27/06

MDL Study Report

Analytical Method: E300.0A

Instrument ID: ICQ

Matrix: Soil

Concentration Units: MG/KG

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Nitrate	11/01/05	0.25	0.225	0.250	0.215	0.240	0.245	0.225	0.255		0.0149	0.0469
Nitrite-N	11/01/05	0.25	0.230	0.270	0.270	0.260	0.270	0.260	0.265		0.0143	0.0449
Sulfate	11/01/05	0.75	0.790	0.735	0.730	0.795	0.775	0.750	0.760		0.0256	0.0806
Chloride	11/01/05	0.25	0.315	0.315	0.340	0.340	0.290	0.300	0.330		0.0193	0.0607
Fluoride	11/02/05	0.5	0.505	0.480	0.500	0.470	0.490	0.485	0.455		0.0173	0.0543

YL060127-16:00-E2877-W

PERCENT MOISTURE
ASTM D2216

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
MOISTURE	Moisture	0.00	0.00	1.18		%	1	35.6812 G	ASTM D2216	12/13/05

PARTICLE SIZE
METHOD 422

Hanford

Particle Size

500.0 **g sample used**

Weight retained is the weight of material ON each sieve

ANALYST: **KH** **12/01/2005**

Lab I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
E287701	J10DV0	8	2362	2.362	33.80	6.80	6.80	93.20
		16	1180	1.180	92.60	18.62	25.41	74.59
		30	600	0.600	197.40	39.69	65.10	34.90
		50	500	0.500	124.60	25.05	90.15	9.85
		100	147	0.147	28.70	5.77	95.92	4.08
		200	75	0.075	12.20	2.45	98.37	1.63
		325	45	0.045	3.40	0.68	99.06	0.94
		pan			4.70	0.94	100.00	0.00
					497.4			

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Tel 541.752.4271 Fax 541.752.0276

pH
METHOD SW9045C

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	7.28		pH	1	20 G	SW9045C	11/23/05

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1123

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1123

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	5.91		pH	1	20 G	SW9045C	11/23/05

TKN
METHOD EPA 351.4

CASE NARRATIVE
TKN

Analytical Method: EPA 351.4 Batch No.: E2877

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 336761.AO.Z Z

Project Name: Washington Closure Hanford Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth M Tepper Date: 1/19/06

Reviewed by: Amber Taylor Date: 1/24/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	21.0	100	408		mg/kg	1	1.0074 G	E351.4	11/22/05

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1122

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1122

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	21.0	100	68.5	B	mg/kg	1	1 G	E351.4	11/22/05

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 11/22/05 13:00

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Kjeldahl Nitrogen	2.0	148	20.0	93.9	200	40.0	2000	-17						

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 11/22/05 13:00

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analyte	Curve Type	r	Q
Total Kjeldahl Nitrogen as N	LNR	0.9998	

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Second Source ID: ICV-1122

Analyte	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	13.6	13.7	0.7	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analytical Lot ID: 112205TKN

CCV #1 ID: CV1-1122 CCV #2 ID: CV2-1122 CCV #3 ID: CV3-1122

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	2	2.05	2.7		20	19.7	-1.6		200	182	-8.9	

COMMENTS:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analytical Lot ID: 112205TKN

CCV #4 ID: CV4-1122 CCV #5 ID: CCV #6 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	20	19.1	-4.5									

COMMENTS:

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1122

SDG No.: E2877

Analysis Method: E351.4

Initial Cal ID: 112205TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1122

Date Analyzed: 11/22/05

Time Analyzed: 1316

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
05	BS1S1122	BS1S1122	11/22/05	1307
23	J10DV0	E287701	11/22/05	1433

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2877

Analysis Method: E351.4

Initial Cal ID: 112205TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S1122

Date Analyzed: 11/22/05

Time Analyzed: 1307

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Kjeldahl Nitrogen as N	680	685	100.6	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 112205TKN

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-1122	CV1-1122	11/22/05	1304
02	CV1-1122	CV2-1122	11/22/05	1304
03	ICV-1122	ICV-1122	11/22/05	1307
05	BS1S1122	BS1S1122	11/22/05	1307
07	SB1-1122	SB1-1122	11/22/05	1316
18	CV3-1122	CV3-1122	11/22/05	1358
23	J10DV0	E287701	11/22/05	1433
27	CV4-1122	CV4-1122	11/22/05	1447

COMMENTS: _____

CH2MHILL
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Fax: 541-752-0276

01/19/06

MDL Study Report

Analytical Method: E351.4
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Kjeldahl Nitrogen	03/17/05	100	100	109	113	103	101	116	99.8		6.66	21.0

TOC SOIL
METHOD SW9060

CASE NARRATIVE
TOC SOIL

CLIENT/PROJECT: Washington Closure Hanford

LABORATORY: CH2M HILL Applied Sciences Laboratory PROJECT NO.: 334247.AO.ZZ

SDG NO: E2877

LAB CODE: CVO LAB BATCH NO: E2877

I. RECEIPT

A. Date Received:
November 22, 2005

B. Sample Information:

LAB SAMPLE ID	CLIENT SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	DATE ANALYZED
E287701	J10DV0	Soil	11/21/2005	12/12/2005

II. Holding Times:
All holding times were met.

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike Sample(s):
Analysis performed in accordance with standard operating procedure.

D. Duplicate Sample(s):
Analysis performed in accordance with standard operating procedure.

E. Lab Control Sample(s):
All acceptance criteria were met.

F. Other:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported By : _____ DATE: 1-4-06

Reviewed By : _____ DATE: 01/04/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DV0

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E287701

Date Received: 11/22/05

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	110	110	7710		mg/kg	1	0.3164 G	SW9060	12/12/05

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1212

SDG No.: E2877

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1212

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	35.0	35.0	35.0	U	mg/kg	1	1 G	SW9060	12/12/05

QC SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Organic Carbon	100	737000	200	1600000	1000	6840000	4000	2.48E+7	8000	4.79E+7				

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Curve Type	r	Q
Total Organic Carbon	LNR	0.9997	

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Second Source ID: ICV-1014

Analyte	Expected	Found	%D	Q
Total Organic Carbon	6430	6680	3.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Analytical Lot ID: 121205TOCS2

CCV #1 ID: CV1-1212 CCV #2 ID: CV2-1212 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	3980	-0.6		4000	4200	5.1					

COMMENTS:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1212

SDG No.: E2877

Analysis Method: SW9060

Initial Cal ID: 101405S1

Matrix: (Soil/Water) SOIL

Instrument: TOC Skalar

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1212

Date Analyzed: 12/12/05

Time Analyzed: 1005

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	BS1S1212	BS1S1212	12/12/05	0953
07	J10DV0	E287701	12/12/05	1116

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

LCS ID: BS1S1212

Initial Cal ID: 101405S1

Date Analyzed: 12/12/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 0953

Instrument: TOC Skalar

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Organic Carbon	1000	877	87.6	80-120	

* Values outside of QC limits

Comments:

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 101405S1

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	ICB-1014	ICB-1014	10/14/05	1046
02	LEVEL1	LEVEL1	10/14/05	1148
03	LEVEL2	LEVEL2	10/14/05	1158
04	LEVEL3	LEVEL3	10/14/05	1208
05	LEVEL4	LEVEL4	10/14/05	1218
06	LEVEL5	LEVEL5	10/14/05	1228
07	ICV-1014	ICV-1014	10/14/05	1252

COMMENTS: _____

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2877

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 121205TOCS2

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-1212	CV1-1212	12/12/05	0943
02	BS1S1212	BS1S1212	12/12/05	0953
03	SB1-1212	SB1-1212	12/12/05	1005
07	J10DV0	E287701	12/12/05	1116
13	CV2-1212	CV2-1212	12/12/05	1543

COMMENTS:

CH2MHILL
Applied Sciences Laboratory

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Fax: 541-752-0276

12/29/05

MDL Study Report

Analytical Method: SW9060

Matrix: Soil

Instrument ID: TOC Skalar

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Organic Carbon	08/17/05	140	31.0	14.4	8.89	29.4	32.4	27.1	6.37		11.1	35.0

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

E2811

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-11	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Price Code 8L	Data Turnaround 45 Days	Air Quality ☐	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Elevated-Site #3 Upriver 100-D	SAF No. RC-051	
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 4000g	ET 11-21-05								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time										
J10DV0	SOIL	11-21-05	16:00	1	1								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth Tepper CH2MHill			
Relinquished By/Removed From: Elizabeth M Tepper	11/22/05 9:00	Received By/Stored In: [illegible]	11/22/05 9:01
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-0 9/29/2005)

CH2MHILL
Analytical Services

Sample Receipt Record

Batch Number: E2877 Date received: 11/22/05

Client/Project Hanford

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation		YES	NO
Radiological Screening for AFCEE			✓
Were custody seals intact and on the outside of the cooler?			✓
If yes, Where? Front____ Rear____ Lt Side____ Rt Side____	HD		
Type of packing material: Ice Blue Ice Bubble wrap	HD		
Was the Chain of Custody inside the cooler?		✓	
Was the Chain of Custody properly filled out?		✓	
Were the sample containers in good condition?		✓	
Containers supplied by ASL?		✓	
Any sample with < 1/2 holding time remaining? If so contact LPM			✓
Was there ice in the cooler? Enter temp. 21 C	HD		
All VOCs free of air bubbles ?	NA		

If the answer to any of the questions above is NO, a Sample Receipt Exceptions Report Must be written.

VERIFICATION OF SAMPLE PRESERVATION (verify all preserved samples except HAAs, HANs and CH)

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	N/A (soils/unpres)
1								X
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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24								
25								
26								
27								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Layna Kaumann 11/22/05 9:50

Date/Time Date/Time

Rev 11/05/2003-reviced.xls